ALSO IN OUR NEWS SECTION Increased interoperability will be the buzz at this week's Storage Networking World.
Q&A: IBM software chief Steve Mills explains his middleware-centric software strategy.

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WHAT YOU'LL EARN

CIO/VP of IT
$153,969 UP 1.8%

Help desk/tech support manager
$68,291 UP 1.2%

Network manager
$68,982 UP 3.7%

Technician
$42,996 DOWN 2.8%

NOTE: [illegible]

SALARY SURVEY 2003

Despite heavier workloads and longer hours, our survey of nearly 15,000 IT professionals shows that most are seeing only small pay raises and flat or declining bonuses. **Stories begin on page 37.**

DOES YOUR PAYCHECK MEASURE UP?
Compare your pay with the results of our 2003 Salary Survey on our Web site
QuickLink a3740

J.D. Edwards Users Push for More Spending on Apps

Companies running green-screen software seek increased commitment from PeopleSoft

BY MARC L. SONGINI

Users of the World ERP applications developed by J.D. Edwards & Co. are mobilizing to lobby new owner PeopleSoft Inc. to keep the aging green-screen software from falling behind the vendor's other products in terms of functionality.

The campaign is being launched by members of the World user advisory panel, which was set up by J.D. Edwards and has been continued by PeopleSoft. It's the latest example of customers banding together to prevent a venerable technology from fading away — and to save themselves from costly migrations.

Q&A
PeopleSoft CEO Craig Conway says Oracle bid won't succeed
PAGE 53

World runs on IBM's iSeries systems, formerly known as the AS/400, and is still used by nearly half of the J.D. Edwards installed base. PeopleSoft plans to focus most of its J.D. Edwards-related development on a newer product line that's now called PeopleSoft EnterpriseOne. But World Advisory Council members are calling for the software vendor to make a larger investment in the green-screen applications so they don't have to switch to EnterpriseOne or other ERP suites.

"We're taking this as an opportunity to [encourage PeopleSoft to] take another step and make three viable lines instead of two and a half," said William Gabby, North American operations manager at Cargill Inc.'s Global Financial Solutions business unit in Minnetonka, Minn. In addition to World and EnterpriseOne,

PeopleSoft, page 53

DNS Servers Prove Resilient

But core system still weak at lower levels

BY JAIKUMAR VIJAYAN

In the year since last October's high-profile attacks on the Internet's root Domain Name System servers, improvements in load distribution and processing capacity have made the Internet's core addressing system more resilient.

But the lack of security at lower levels of the DNS stack remains worrisome, according to security experts. And progress on a critical security enhancement designed to add data authentication and integrity services to the DNS protocol remains disappointingly slow, they added.

"The state of it all is somewhat uneven," said Paul Mockapetris, inventor of the DNS and chairman of the board at IP address management vendor Nominum Inc. in Redwood City, Calif.

More Inside
DNS creator Paul Mockapetris discusses the state of DNS security.
PAGE 14

"The root server operators have created more replicated copies of the root servers. So they are certainly less vulnerable to denial-of-service attacks and the like," he said.

Some of the operators have also strengthened their systems by adding more process-

DNS Servers, page 14

RFID Users Differ on Standards

Pentagon insists on ISO specs; corporate users back EPC plan

BY BOB BREWIN

The U.S. Department of Defense wants to leverage radio frequency identification technology that's being developed for use in commercial supply chains. But a Pentagon official last week said the RFID tags used by the military must conform to upcoming specifications from the International Standards Organization.

In contrast, Wal-Mart Stores Inc. and other corporate users have said they plan to adopt an electronic product code standard that's being devised by EPCglobal Inc.

Some suppliers and analysts voiced concerns that the use of different standards could result in higher costs for com-

RFID, page 14

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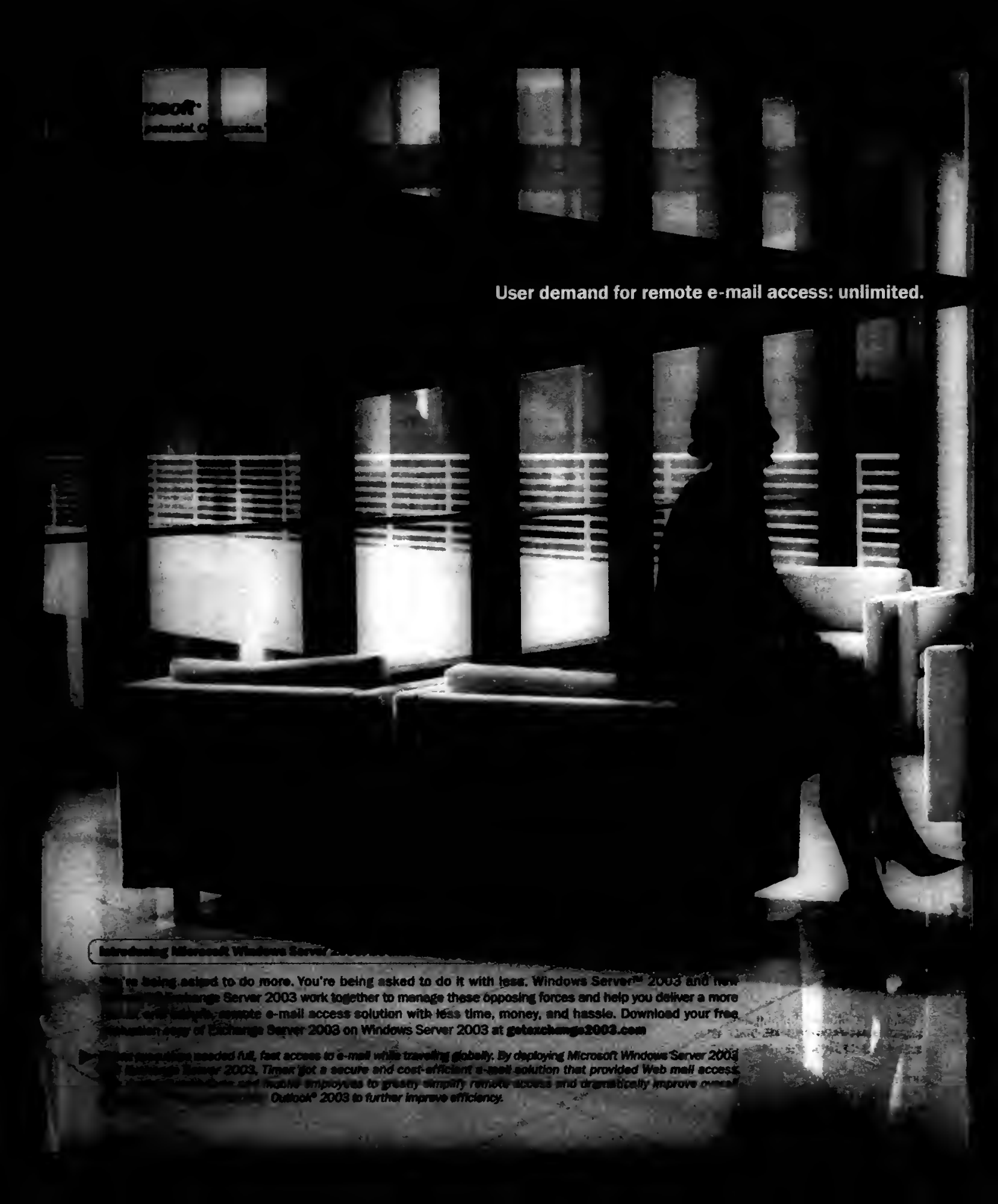
User demand for remote e-mail access: unlimited.
Introducing Microsoft Windows Server
Exchange Server 2003 work together to manage these opposing forces and help you deliver a more
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needed full, fast access to e-mail while traveling globally. By deploying Microsoft Windows Server 2003
Server 2003, Timex got a secure and cost-efficient e-mail solution that provided Web mail access
and mobile employees to greatly simplify remote access and dramatically improve overall
Outlook® 2003 to further improve efficiency.

Your budget for remote e-mail access: very limited.
Microsoft
Windows Server 2003

Goodbye
Hackers
The right management should do more than just protect.
It should also enable.
eTrust™ Security Management Software
With eTrust security management software, your information isn't just safeguarded from internal and external threats. We provide authorized customers, partners, and employees with appropriate access that can help your business grow. In addition to securing data, eTrust also provides a single view of your security environment, so you can make real-time decisions based on comprehensive information. If you're looking for ways to minimize risk while maximizing your potential, or to get a white paper, go to ca.com/security.
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KeyCorp Wins Mirroring Marathon

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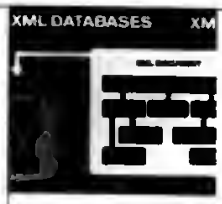

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7 **IBM is backing** a technology that uses standards built on messaging systems to connect disparate applications.

7 **Storage Networking World:** Vendors such as Brocade and HP plan to push for interoperability support.

8 **Veritas intends to port** its storage tools to SUSE Linux.

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MANAGEMENT

SALARY SURVEY 2003

Economic pressures have put a pinch on IT compensation again this year. While workloads are heavier and hours longer, our survey of nearly 15,000 IT professionals shows that most are seeing only small pay raises and flat or declining bonuses. STORY BEGINS ON PAGE 37.

Our Salary Survey results are presented in a three-page chart that details compensation information for more than 40 IT job titles and offers regional, industry and company revenue comparisons. CHARTS BEGIN ON PAGE 38.

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21 **Dan Gillmor** hails the recent profits among chip makers and their ongoing competition as great oews for IT's future hardware investments. Unfortunately, there isn't similar oews on the software side.

35 **Tommy Peterson** says we shouldn't tolerate software bugs — they're taking too big a bite out of the economy.

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What's a QuickLink?

Throughout each issue of Computerworld, you'll see five-digit QuickLink codes pointing to related content on our Web site. Also, at the end of each story, a QuickLink to that story online facilitates sharing it with colleagues. Just enter any of these codes into the QuickLink box, which is at the top of every page on our site.

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AT DEADLINE

Goodyear Restates Due to IT Problems

The Goodyear Tire & Rubber Co. said it will restate its financial results dating back to 1998 because of errors caused by the faulty rollout of an accounting system based on SAP AG's software, plus processing mistakes on older billing systems. Akron, Ohio-based Goodyear expects to erase up to $100 million in profits. The company blamed its implementation, not the SAP software. SAP said it's working with Goodyear to fix the accounting system, which was installed in 1999.

Dynegy Hands IT Work to Accenture

Dynegy Inc., a Houston-based electric and gas utility, announced a deal to outsource IT infrastructure and application management services to Accenture Ltd. Financial terms weren't disclosed, but Dynegy said it expects to save "tens of millions of dollars . . . over the coming years." About 100 Dynegy IT workers will be laid off but will be considered for new jobs at Accenture.

IT Spending Slow in Q1, Microsoft Says

Microsoft Corp. reported a profit of $2.6 billion on $8.22 billion in revenue for its first quarter, which ended Sept. 30. But corporate IT spending "was slow to improve" during the quarter, the company said. Microsoft noted that the amount of deferred revenue from software licensing deals recorded on its balance sheet dropped by $768 million, more than twice the amount it had forecast.

Short Takes

MICROSOFT revised two software patches in an effort to fix problems that affected foreign-language versions of Windows and Exchange. . . . NORTEL NETWORKS LTD. said it's restating financial results dating back to 2000 to lower the losses it reported.

Microsoft to Focus On App Management

Ballmer suggests intent to acquire Web services management technology

BY CAROL SLIWA AND MATT HAMBLEN
LAKE BUENA VISTA, FLA.

MICROSOFT CORP. CEO Steve Ballmer last week said the software maker intends to put greater emphasis on developing management functionality in its applications. And to that end, users should "stand by for news" of an acquisitioo by Microsoft in the area of XML Web services, he said.

Ballmer, in a keynote interview with Gartner Inc. analysts at the Gartner Symposium ITxpo 2003 here, didn't elaborate on his acquisition plan. But speculation among industry observers focused on the acquisition of a Web services management vendor, and the one that appeared to be at the center of tbe speculation was AmberPoint Inc. in Oakland, Calif.

Jason Bloomberg, an analyst at ZapThink LLC in Waltham, Mass., said Microsoft has expressed interest in investing in Web services management. He said if Microsoft should acquire a company in that space, it would likely be a vendor that is ".Net savvy."

Bloomberg noted that AmberPoint and Actional Corp. fall into that category, but he said be doubts it would be one of them. "Microsoft tends to wait until a company has achieved some level of success," be said.

Microsoft said earlier this month that it's working with other vendors to ensure that .Net-based Web services written for the Windows operating system can be managed in a heterogeneous environment. Microsoft Operations Manager management packs for Web services from Actional, AmberPoint and Computer Associates International Inc. will be unveiled next week at Microsoft's Professional Developers Conference in Los Angeles.

David Hamilton, director of Microsoft's enterprise management division, said the company decided to work with those vendors because they have good .Net offerings and J2EE products. He said be has met witb many Web services management companies in the past 12 months, and only a subset fit into that category.

"We felt those three companies were doing interesting things," Hamilton said. "They were excited about what was going on, and they actually had some customers that had this need. None of the Web services managemeot companies have a lot of customers. Most of them are less than 50 customers. But Actional and AmberPoint [have more], and we thought that would be a great chance to work together to try some of these things out."

> [Microsoft's goal is] to give ourselves and our customers the tools to design applications that are manageable from the get-go.
>
> **STEVE BALLMER, CEO, Microsoft**

Gartner analyst David Smith said customers believe Microsoft generally treats management as an "afterthought" in applicatioo developmeot. In response, Ballmer conceded, "It's always a tricky thing to know how to weave together an approach to developing new applications and managing them. And you're right — the right way to do it is at the same time."

Ballmer said Microsoft has had a bias to build an application first, which "sometimes makes it hard to get the management right afterward." He added that Microsoft is "really focused . . . to give ourselves and our customers the tools to design applications that are manageable from the get-go."

Ballmer also conceded that Microsoft's Dynamic Systems Initiative, while designed to "really focus in on the next generation of manageability," is just as mucb of a marketing label as those phrases used by competitors.

"In some senses, that's what all these slogans are; they're great advertisements," he said. "That's what 'on demand' is, that's what 'adaptive enterprise' is, that's what 'software for the agile business' is," Ballmer said. **42325**

Users Welcome Better Management, 'On Demand' or Not

LAKE BUENA VISTA, FLA.

Same puzzler, different place. Some users were once again left scratching their heads about what vendors really mean when they talk about "on-demand" computing. This time the venue was last week's Gartner Symposium ITxpo 2003 here.

While some users at the event said they realize that the on-demand strategy loosely refers to using management software tools to align IT infrastructure with business priorities, they generally were unable to say what's really new other than grouping existing management tools under s new marketing umbrella.

Others were simply glad to see s renewed emphasis on systems management. "There's s big need, absolutely, for better management tools," said Gary Caldwell, general manager of IT at Cinergy Corp. in Cincinnati. The electricity and gas utility uses products from Altiris Inc. in Lindon, Utah, for s wide range of systems-monitoring and virus-protection functions.

Computer Associates illustrated its on-demand story at the Gartner event by showcasing s customer, International Paper Co., that has used CA's Unicenter management tools for about 18 months to achieve on-demand-like benefits. Ben Morris, senior manager of enterprise architecture at Stamford, Conn.-based International Paper, said CA's BrightStor Storage Resource Manager helped the company quickly locate 5% more storage capacity in s 50TB storage infrastructure.

Another CA tool, Unicenter NSM, has made it possible for s single IT worker to manage 169 system components, up from 85 three years ago, Morris said. And with Unicenter ServicePlus Service Desk, system problems have been solved faster, with the most serious ones getting solved first, he said.

International Paper found that implementing on-demand processes created cultural challenges. Some IT workers have been reluctant to relinquish control of their systems to automated management tools, Morris said.

Louis Blatt, senior vice president of CA Unicenter, said it's common for divisions within companies to claim s group of servers or other devices as their own to run their departmental applications. But an on-demand strategy requires them to relinquish ownership as applications and computing time are shifted and shared across an enterprise, he said.

– Matt Hamblen

IBM Plans to Release Enterprise Service Bus

Move may help validate budding technology

BY PATRICK THIBODEAU

IBM intends to release an enterprise service bus (ESB) next year, a move likely to raise the profile of the relatively nascent but potentially far-reaching integration technology.

In a briefing with *Computerworld* editors last week, John Swainson, IBM's general manager of application development and integration, said the company will deliver "an enterprise-class messaging bus that would attach everything to everything." Swainson said IBM's ESB will enable companies to put existing messaging traffic in an environment that allows "every application to talk to this bus."

ESBs typically use messaging technology combined with a service-oriented architecture, XML, Web services protocols and intelligent routing to tie together disparate systems. Vendors and analysts say it's a less costly alternative to proprietary integration approaches, and they expect widespread adoption.

'Disruptive Technology'

Framingham, Mass.-based IDC, in a report released in March, called ESBs a "disruptive technology." And Stamford, Conn.-based Gartner Inc. said it will become a major market force.

Despite rave reviews from analysts, ESB adoption remains low. One integration vendor, Tibco Software Inc. in Palo Alto, Calif., maintains that there isn't enough customer demand to offer the technology. And the reason for that, said Matt Quinn, the company's chief architect, is that an ESB works for low-level integration problems but won't help a company manage complex business processes.

But ESB vendors Sonic Software Corp. in Bedford, Mass., and SpiritSoft Ltd. in Boston said IBM's decision to build an ESB will draw attention to a technology that remains in the very early stages of customer adoption.

IBM validates the market, said Robert Davies, chief technology officer at SpiritSoft, "and that's good for everybody."

Another vendor that may also be giving credibility to the ESB concept is Microsoft Corp. At its Professional Developers Conference in Los Angeles this week, Microsoft will unveil its "Indigo" programming model. But Gartner analyst Roy Schulte said Indigo will include features similar to those used in ESBs.

Those characteristics include Web services, the equivalent of message-oriented middleware, simple intelligent routing and a distributed peer-based architecture rather than an architecture built around a central hub, said Schulte.

Although ESB technology is based on open standards, a standard is missing that "pulls them all together," said Gordon Van Huizen, chief technology officer at Sonic. Van Huizen said he expects to see several competing implementations of ESBs before standards agreements are reached.

The standards issue worries one early adopter, Jon Johnson, chief engineer at defense contractor Northrop Grumman Mission Systems in Colorado Springs. Johnson, a Sonic user, said adoption of open standards reduces costs because it eliminates the need for custom interfaces. Consequently, he can rely on the skills of his IT staff rather than having to pay consulting fees.

But Johnson said a failure by vendors to agree on a standard for the underlying architecture could lead to proprietary protocols, reducing the benefits of ESBs.

Sonic and some other vendors have been working with Sun Microsystems Inc. on a Java Specification Recommendation, JSR208, that will be used for ESB systems. IBM is not part of the effort, but a company spokeswoman said it's looking at the JSR and is committed to open standards.

IBM's ESB will be offered along with its messaging platform MQSeries, but the company declined to comment on how it will be priced. **42341**

Correction

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Interoperability Push Expected at Storage Conference

Vendors to showcase products designed to let storage devices work together

BY LUCAS MEARIAN

At this week's Storage Networking World Fall 2003 conference, vendors such as Hewlett-Packard Co. and Brocade Communications Systems Inc. plan to unveil technology that's designed to support increased interoperability between storage devices.

The conference, which is being held in Orlando, will also feature dozens of user case studies and is expected to draw more than 2,500 attendees. The four-day event is cosponsored by *Computerworld* and the Storage Networking Industry Association, a trade group in San Francisco.

Gary Pilafas, senior storage and systems architect at UAL Loyalty Services Inc. in Arlington Heights, Ill., said he expects to see greater integration of products through the Storage Management Interface Specification, a set of application programming interfaces (API) and protocols that let storage management tools control storage devices made by different vendors.

Pilafas uses storage resource management software from CreekPath Systems Inc. in Longmont, Colo., to access detailed information about the storage-area network (SAN) at UAL Loyalty Services, a unit of United Air Lines Inc. that manages its Web site and frequent-flier programs. "Tools like that become more powerful as these companies open up their APIs," Pilafas said.

SAN Connections

San Jose-based Brocade will announce a Fibre Channel-to-Fibre Channel router for connecting separate SANs installed across office campuses. The router will also give systems administrators the ability to configure ports for the iSCSI and Fibre Channel-over-IP protocols, according to Dave Stevens, the company's vice president of alliances.

The 16-port device uses Brocade's proposed Fabric Application Interface specification to act as a translator between SANs so they can share storage and server resources, Stevens said. The router is due in the first half of 2004.

In another integration-related move, HP plans to announce an initiative aimed at ensuring interoperability between Brocade's storage switches and SAN directors and rival devices made by Cisco Systems Inc. and Broomfield, Colo.-based McData Corp. HP resells products from all three vendors.

Steve Jerman, a storage management architect at HP's storage software division, said the company is running tests to ensure that its switch partners fully conform to the Fibre Channel standard.

By January, HP plans to release a set of free design rules that will give users a step-by-step guide to the configurations that are needed to achieve interoperability between Brocade and McData switches. Information about Cisco's devices should be added shortly after that, HP said.

"What happens is a lot of the manufacturers want to put added-value things on their switches," Jerman said. "We're getting those companies to follow those standards exactly." **42329**

MORE STORAGE NEWS

Q&A: Go to our Web site to read an interview with Bob Schultz, head of HP's storage products division

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Enterprise Service Bus

What makes it possible: Web services and related protocols

Business value: Cuts integration cost by relying on open standards; in-house IT staff can do the work.

Potential problem: Vendors haven't agreed on standards for underlying architecture.

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ANNOUNCEMENTS

A new director class storage switch

A Fibre Channel to Fibre Channel router

Interoperability tests between storage switches from multiple vendors

A disk-to disk data backup and restore server

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Q&A Go to our Web site to read an interview with Bob Schultz, head of HP's storage products division.

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For a complete overview of storage technology, visit our online Storage Knowledge Center.

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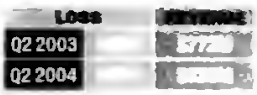
www.computerworld.com

BRIEFS

i2's Revenue Continues to Shrink

Supply chain management software maker i2 Technologies Inc. posted a profit for its third quarter, despite a significant decline in revenue. The Dallas-based company announced third-quarter earnings of $7 million on revenue of $117 million, a drop from earnings of $34 million on $374 million in revenue for the same quarter last year.

CA Has $87M Loss



Computer Associates International Inc. reported a loss of $87 million on revenue of $833 million for its second quarter of fiscal 2004. That compares with a loss of $52 million on revenue of $772 million in the same quarter last year. The figures released last week reflect $113 million in charges to settle litigation.

IBM Adds Digital Content Tool

IBM has added a version of its content management software to its Express line of midmarket products, offering a tool for managing digital content such as image files. DB2 Content Manager Express is available for $9,375 per server and $1,063 per concurrent user. The product is currently available only for Windows servers.

Short Takes

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MARK HALL • ON THE MARK

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Immortal Data

If you think someone might want to peruse your data 20 or more years hence, consider Encapsulated Archive from Outer Bay Technologies Inc. in Campbell, Calif. It uses XML to embed metadata and permits the information to be read without the application that created it. You know, long after Microsoft discontinues support for Office 2015. The product costs $50,000.

Veritas Ports Storage Tools to SUSE Linux

BY TODD R. WEISS

Veritas Software Corp. this week will announce that it plans to port all of its storage management tools to SUSE Linux AG's version of the open-source operating system.

Mountain View, Calif.-based Veritas already offers its applications for use on Red Hat Inc.'s Linux distribution as well as for Windows and versions of Unix from Hewlett-Packard Co., IBM and Sun Microsystems Inc. Ranajit Nevatia, director of Linux strategy at Veritas, said support for SUSE Linux Enterprise Server 8 is due to be added in January.

Later next year, the Veritas applications will also be readied for an upcoming Enterprise Server 9 upgrade of the operating system, said Uwe Heine, chief alliance officer at SUSE in Nuremberg, Germany. He added that the two companies will work together to provide technical support and services to users.

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Al Gillen, an analyst at IDC, said the deal with Veritas could help SUSE in its battle for Linux market share with Raleigh, N.C.-based Red Hat. "For SUSE to really get in there and compete with Red Hat, they needed this," Gillen said. **42343**

BRIEFS

i2's Revenue Continues to Shrink

Supply chain management software maker i2 Technologies Inc. posted a profit for its third quarter, despite a significant decline in revenue. The Dallas-based company announced third-quarter earnings of $7 million on revenue of $117 million, a drop from earnings of $34 million on $374 million in revenue for the same quarter last year.

CA Has $87M Loss

Q2 2003	$52M	$772M
Q2 2004	$87M	$833M

Computer Associates International Inc. reported a loss of $87 million on revenue of $833 million for its second quarter of fiscal 2004. That compares with a loss of $52 million on revenue of $772 million in the same quarter last year. The figures released last week reflect $113 million in charges to settle litigation.

IBM Adds Digital Content Tool

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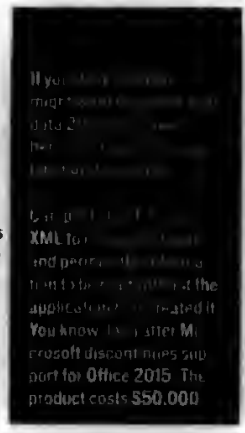

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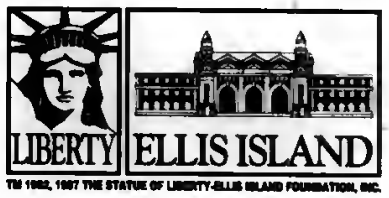

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Potential AT&T Merger Puts Customers on Alert

ITxpo attendees say they're preparing for possible industry consolidation

BY MATT HAMBLEN
LAKE BUENA VISTA, FLA.

SOME AT&T CORP. customers are preparing themselves in case the telecommunications company merges with another carrier — a possibility that was discussed at Gartner Inc.'s Symposium/ITxpo 2003 conference here last week.

One of the companies keeping an eye on the merger talk is Internap Network Services Corp., which provides a national overlay backbone network used by AT&T to support its Internet services. Atlanta-based Internap has tried to insulate itself by providing redundancy through the use of eight additional network backbones from other carriers, said Jeff Hacker, the company's national manager of alliance development.

"We did that because we didn't want all our eggs in one basket," he said, citing the possibility of consolidation in the telecommunications industry.

Gartner analyst Jay Pultz put the odds that AT&T will be bought by or merge with another carrier during the next several years at 40%. The potential suitor for AT&T that's mentioned most often is BellSouth Corp., Pultz said.

Declining revenue for AT&T and rival vendors has created a market that's ripe for consolidation, added Tim Smith, another analyst at Stamford, Conn.-based Gartner. For example, AT&T last week reported a 9% drop in third-quarter revenue on a year-over-year basis [QuickLink 42274].

Neither AT&T nor Atlanta-based BellSouth would comment on the potential for a merger.

"That AT&T/BellSouth merger possibility has come up in waves over the past three years, but it's not something we talk about," said BellSouth spokesman Todd Smith.

The Gartner analysts recommended that users renegotiate their long-term contracts with AT&T and other carriers to give them more options in the event a merger does take place. "Customers need to be able to say, 'I don't like this new partner, and I don't think you'll follow your earlier strategy,'" Pultz said.

Several AT&T customers at the conference said privately that they fear a merged company might move in directions that could be adverse to their current network plans.

But Matthew Mitchell, vice president of information services at Knowledge Learning Corp. in San Rafael, Calif., said he isn't worried. Knowledge Learning, which runs early childhood development centers in 34 states, recently chose AT&T as its principal voice and data services provider for 25,000 workers nationwide.

Mitchell, who is based in Golden, Colo., said he's alert to any news about AT&T but added that he thinks the multimillion-dollar deal Knowledge Learning signed will still be good even if a merger does take place. One reason, he said, is that "any merger would take two to three years" to fully affect AT&T's operations.

Knowledge Learning chose AT&T over other carriers because it offers local voice and data services that other long-distance carriers couldn't match, Mitchell said. **42328**

MORE NEWS

Former cybersecurity czar calls for IT security audit standards.
QuickLink 42236
www.computerworld.com

Negotiating Tactics

- **Don't give one** telecommunications carrier all your business.
- **Renegotiate contracts** to take advantage of favorable prices being offered by revenue-hungry vendors.
- **Play the loyalty card** if you're already a customer and ask for better terms than new users get.
- **Shorten contracts and insist** on rate caps to limit the potential for cost increases while they're in effect.

SOURCES: GARTNER ANALYSTS, CONFERENCE ATTENDEES

Mutual Fund Companies Not Sold on Straight-Through Trade Processing

Report says investment managers aren't convinced of the technology's benefits

BY LUCAS MEARIAN

Some mutual fund companies, such as Legg Mason Inc., are seeing business benefits after installing straight-through processing (STP) technology. But efforts within the financial services industry to promote widespread adoption of automation by investment managers still face big challenges.

For example, a report released last week by TowerGroup in Needham, Mass., claims that the campaign to sell so-called buy-side firms on automated systems that can support the seamless flow of stock-trading data within and between companies has failed. STP proponents have neglected business objectives while extolling the virtues of technical integration, the report said.

For example, backers of the technology haven't done enough to show how STP can help investment managers provide better customer service and add CRM capabilities, according to TowerGroup analyst Timothy Lind.

STP has become the "Frankenstein's monster of financial acronyms," Lind said in the report. "Maybe it's time to pick up a torch and pitchfork and rein in this monster before it bores any more villagers to death."

Why Buy?

Jane Soybelman, chief technology officer at Asset Management Technology Solutions, an IT subsidiary of Baltimore-based Legg Mason, agreed with the report's contention that the potential benefits to mutual fund companies haven't been adequately explained. "People need to agree on what STP means for everyone," not just for sell-side brokerages and banks, she said.

Legg Mason, which manages about $200 billion worth of assets, last year installed middleware from New York-based Heliograph Inc. to automate its back-end trade-clearance process. It also standardized on an order management system and two messaging formats — ISO 15022 and the Financial Information Exchange — for communicating during the post-trade settlement process with custodian banks that hold stock and bond certificates for clients.

Soybelman said the company has already seen a return on its investment, which was under $1 million. She added that she expects to save millions of dollars over the next few years through the continued elimination of manual processes and a reduction in administrative personnel.

"I definitely try to convince my clients [in Legg Mason's business units] that if STP is done right on the buy side, it can have a great deal of benefits," Soybelman said.

SOURCE: TOWERGROUP, NEEDHAM, MASS.

The effort to promote STP has mainly been led by the New York-based Securities Industry Association, which acknowledged that mutual fund companies and other investment managers lag far behind brokerages in adopting STP technologies.

The SIA has set a 2005 target date for achieving the key objectives of STP, such as electronic trade allocation and matching (see box). John Panchery, managing director of the SIA and its STP project manager, said that about 80% of buy-side firms are still using phones and fax machines to relay order information.

"But as long as we have the systems in place [by 2005], the business drivers will be able to force firms to understand the value of automation," he said.

Panchery called the TowerGroup report a "good constructive comment," but he said that the SIA has made considerable strides in working with buy-side firms to educate them on the benefits of STP. **42323**

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BRIEFS

Boeing Taps Dell For PC Support

The Boeing Co. awarded Dell Inc. a five-year contract to support desktop and notebook PCs used by Boeing's Integrated Defense Systems business unit. Dell will take over responsibility for tasks such as systems installation, software distribution and repairs. Dell and Chicago-based Boeing declined to disclose the value of the deal or the number of systems Dell will manage.

CSC, Providian Ink Outsourcing Deal

Computer Sciences Corp. announced an IT outsourcing deal with Providian Financial Corp., a credit card company in San Francisco. Neither the financial terms nor the length of the contract were released. El Segundo, Calif.-based CSC said it will manage Providian's desktop systems, servers and networks, plus its IT security and help desk functions. About 150 Providian IT workers will shift to CSC.

IBM Adds License For DB2 Express

IBM added an unlimited-user license for its DB2 Express database, which is aimed at small and midsize companies. The license costs $3,899, compared with IBM's regular price of $624 for the software plus $124 per and user. The move by IBM followed Oracle Corp.'s announcement earlier this month of an entry-level database priced at $5,995 for an unlimited number of users.

Short Takes

SYMANTEC CORP. in Cupertino, Calif., said it has acquired SAFEWEB INC., a vendor of virtual private network technology in Emeryville, Calif., for $26 million in cash. . . . PEOPLESOFT INC. said it has teamed with IBM to provide software to help financial services firms comply with Basel II risk management requirements.

EDS Files to Dismiss Lawsuit, Extends Its N/MCI Funding

Vows to defend itself against allegations of mishandling $6.9B Navy intranet deal

BY DAN VERTON

Lawyers for Electronic Data Systems Corp. last week filed a legal motion to dismiss a class-action lawsuit by shareholders who allege that the company committed securities fraud and improperly handled "problem contracts," including the $6.9 billion Navy/Marine Corps Intranet (N/MCI) deal.

A court date to determine whether the case will go forward has been tentatively set for Nov. 10.

However, Ron Zahn, a certified public accountant and fraud investigator who's been retained by the New York law firm representing the shareholders, Bernstein Litowitz Berger & Grossmann LLP, said EDS's filings with the U.S. Securities and Exchange Commission show that "they admit certain things" regarding the company's alleged mishandling of the N/MCI contract [QuickLink 39658].

Taking Responsibility

In a 10-K statement filed with the SEC in March, EDS acknowledged, among other things, that "material delays in the assumption of responsibility for or installation of additional seats under [the N/MCI] contract could negatively impact the financial performance of this contract and significantly reduce our earnings and operating cash flow during the quarter in which any such delays occur."

In addition, EDS acknowledged that the N/MCI rollout schedule on which the company's pricing was based has been delayed significantly.

EDS also acknowledged that it released the Navy from any liability under the contract for certain potential claims.

According to the Plano, Texas-based company's most recent 10-Q quarterly earnings report, filed Aug. 13, EDS intends to defend itself against the shareholder lawsuit "vigorously." That statement also noted that the SEC has requested documents related to the N/MCI contract.

Kevin Lightfoot, a spokesman for EDS, said "nothing has changed since last quarter" regarding the lawsuit and the company's estimates of what effect, if any, it might have on the future of the N/MCI contract.

Financing Extended

Meanwhile, EDS last week said it's extending and expanding the finance vehicle associated with the N/MCI contract.

Under the terms of the new agreement, EDS's line of credit to cover investments in the contract has increased from $600 million to $900 million and has been extended from 2005 to 2007. According to Lightfoot, the $300 million increase matches the current N/MCI equipment deployment forecast.

"This line of credit allows us to accelerate our receipt of cash by selling future receivables to financial institutions to match our cash flow," said Lightfoot. This enables EDS to get paid immediately for hardware deployments, even though the Navy isn't contractually required to pay for the equipment for 60 to 90 days after deployment.

EDS will release its third-quarter earnings report on Oct. 29. **42348**

EDS Extends PLM to Windows Desktops

Product life-cycle tools not just for engineering

BY JAIKUMAR VIJAYAN

Product life-cycle management (PLM) tools — long confined to use in engineering environments — may be slowly headed out of their traditional niche.

Last week, Plano, Texas-based Electronic Data Systems Corp. announced a version of its Teamcenter PLM software that's designed for use in a standard Windows desktop environment.

The product, dubbed Teamcenter Community, offers a range of collaborative capabilities that give users of Windows 2000 and later versions access to product life-cycle information locked up in engineering systems.

With it, more people within an enterprise, including marketing and finance teams, as well as suppliers and partners, will be able to access, visualize and collaborate around product information such as computer-aided design models and drawings, according to the company.

"What this does is to move the world of the engineer closer to the world of the rest of the enterprise," said Michael Burkett, an analyst at Boston-based AMR Research Inc.

Such capabilities can significantly reduce the time it takes manufacturers to bring new products to market, said John Loo, senior manager of technical computing at Callaway Golf Co. in Carlsbad, Calif.

Callaway has tested the product for the past two months and is preparing to deploy it across the company.

Teamcenter Community will enable the sporting goods company's domestic and international suppliers to share product data far more efficiently than is possible with current processes, such as fax, e-mail and postal mail, according to Loo.

Common Portal

With Teamcenter Community, suppliers can log into a common portal from a Windows desktop and access, view and comment on product-related documents. The tool also offers some basic routing and version-control features that will give Callaway more control over shared product documents, Loo said.

"One of the biggest constraints when dealing with international suppliers especially is just the speed of communications," he said. "This is going to help us improve our time to market."

The move by EDS is similar to those of rivals such as IBM, Burkett said. But Teamcenter Community appears to be more tightly integrated with the Windows desktop environment than other PLM products are, he added.

"EDS has put the most effort in terms of extending it to the desktop," Burkett said.

Teamcenter Community is built around Microsoft Office's SharePoint services and will cost companies about $250 per user per year. **42335**

Corporate Execs Try New Ways To Align IT With Business Units

CFOs look to portfolio management, other means of handling IT projects

BY THOMAS HOFFMAN
CHICAGO

Although CIOs traditionally rank alignment between IT and business as a top priority, chief financial officers attending a conference here last week said that closing the gap often requires new ways of thinking — or new personalities in management.

For example, Thomas Williams, chief process officer at AT&T Corp., said poor alignment between the company's IT department and business units "was absolutely an issue" until AT&T adopted a portfolio management approach to IT projects in January.

The new technique, which applies the same Buy, Hold or Sell criteria that financial investors use, lets AT&T evaluate whether the more than 100 IT projects in the pipeline at any given time are meeting their business objectives, such as reduced costs or improved customer satisfaction.

That has made it easier for corporate executives to "make conscious decisions on which investments to stop and continue," Williams said. It also has given AT&T "a regular, repeatable process that has teeth to it" for ensuring that IT projects are aligned with business goals, he added.

Alignment remains a challenge at many companies, based on comments by conference attendees and survey results released by Boston-based CFO Publishing Corp., which sponsored the event. Twenty-two of the 50 chief financial officers surveyed cited weak alignment between IT and business strategies at their companies, while two others said there's no alignment at all within their organizations.

The research, which was funded by Novell Inc., is consistent with earlier surveys of between 200 and 300 CFOs, according to Mary Driscoll, president and editorial director of CFO Publishing's events arm. Novell executives discussed the results during a breakfast session and said the findings mapped with challenges being cited by the company's users. But they didn't pitch the use of Novell's software to help bridge the gap.

What You Should Do

To help achieve better alignment, Cisco Systems Inc. assigns an IT and business leader to each technology project and makes them jointly responsible for the initiative, said Dennis Powell, the networking vendor's CFO. "We changed our thinking about IT from a cost center to a strategic partner," he said.

Several CFOs said much of the alignment gap is the result of personality conflicts.

Tom Goldstein, CFO at LaSalle Bank Corp. in Chicago, said the relationship between business units and the bank's IT department "wasn't that great" under its previous CIO. But he added that things have improved since current CIO Sam Halim joined the company. "I trust the guy very much, and we share a vision," Goldstein said.

Despite the continuing alignment issues, many attendees were quick to defend CIOs. "Most CFOs would agree that the alignment problem isn't the fault of IT," said Ian Downes, a consultant at Cap Gemini Ernst & Young U.S. LLC in Rosemont, Ill. "IT departments are inundated with requests and often find themselves in reactive mode."

To help guarantee that projects are synchronized with business needs, Downes recommended that IT staffers work stints in departments such as finance or human resources so they can get a better understanding of how those units work. 42353

Vendors Note Demand Shift To Intrusion-Prevention Tools

BY JAIKUMAR VIJAYAN

The mixed results that users have had dealing with intrusion-detection technologies is fueling greater industry interest in intrusion-prevention products.

Last week, Network Associates Inc. announced software designed to help companies not only detect network- and system-level attacks, but also block them more proactively.

One of the new products from Santa Clara, Calif.-based Network Associates is a desktop version of a server-based intrusion-prevention technology that the company acquired through its $120 million purchase of Entercept Security Technologies in May.

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Security Update

Network Associates' new intrusion-prevention products:

- **McAfee Entercept Desktop,** for detecting and preventing intrusions at the desktop. **Price: $60 per node**
- **McAfee IntruShield 1.8,** an enhanced version of the IntruShield network intrusion-prevention product. **Price: not available**

Network Associates isn't alone in releasing intrusion-prevention wares. Last week, Sunnyvale, Calif.-based NetScreen Technologies Inc. announced a "deep-inspection" firewall that combines signature-, policy- and network-behavior-based approaches to block application-level attacks. And earlier this month, Teros Inc. announced an enhanced version of its host-based intrusion-prevention product.

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"We noticed some clear benefits in having invested in IPS when Blaster hit," Kundra said. 42346

BRIEFS

Boeing Taps Dell For PC Support

The Boeing Co. awarded Dell Inc. a five-year contract to support desktop and notebook PCs used by Boeing's Integrated Defense Systems business unit. Dell will take over responsibility for tasks such as systems installation, software distribution and repairs. Dell and Chicago-based Boeing declined to disclose the value of the deal or the number of systems Dell will manage.

CSC, Providian Ink Outsourcing Deal

Computer Sciences Corp. announced an IT outsourcing deal with Providian Financial Corp., a credit card company in San Francisco. Neither the financial terms nor the length of the contract were released. El Segundo, Calif.-based CSC said it will manage Providian's desktop systems, servers and networks, plus its IT security and help desk functions. About 150 Providian IT workers will shift to CSC.

IBM Adds License For DB2 Express

IBM added an unlimited-user license for its DB2 Express database, which is aimed at small and midsize companies. The license costs $3,899, compared with IBM's regular price of $624 for the software plus $124 per end user. The move by IBM followed Oracle Corp.'s announcement earlier this month of an entry-level database priced at $5,995 for an unlimited number of users.

Short Takes

SYMANTEC CORP. in Cupertino, Calif., said it has acquired SAFEWEB INC., a vendor of virtual private network technology in Emeryville, Calif., for $26 million in cash. . . . PEOPLESOFT INC. said it has teamed with IBM to provide software to help financial services firms comply with Basel II risk management requirements.

EDS Files to Dismiss Lawsuit, Extends Its N/MCI Funding

Vows to defend itself against allegations of mishandling $6.9B Navy intranet deal

BY DAN VERTON

Lawyers for Electronic Data Systems Corp. last week filed a legal motion to dismiss a class-action lawsuit by shareholders who allege that the company committed securities fraud and improperly handled "problem contracts," including the $6.9 billion Navy Marine Corps Intranet (N/MCI) deal.

A court date to determine whether the case will go forward has been tentatively set for Nov. 10.

However, Ron Zahn, a certified public accountant and fraud investigator who's been retained by the New York law firm representing the shareholders, Bernstein Litowitz Berger & Grossmann LLP, said EDS's filings with the U.S. Securities and Exchange Commission show that "they admit certain things" regarding the company's alleged mishandling of the N/MCI contract [QuickLink 39658].

Taking Responsibility

In a 10-K statement filed with the SEC in March, EDS acknowledged, among other things, that "material delays in the assumption of responsibility for or installation of additional seats under [the N/MCI] contract could negatively impact the financial performance of this contract and significantly reduce our earnings and operating cash flow during the quarter in which any such delays occur."

In addition, EDS acknowledged that the N/MCI rollout schedule on which the company's pricing was based has been delayed significantly.

EDS also acknowledged that it released the Navy from any liability under the contract for certain potential claims.

According to the Plano, Texas-based company's most recent 10-Q quarterly earnings report, filed Aug. 13, EDS intends to defend itself against the shareholder lawsuit "vigorously." That statement also noted that the SEC has requested documents related to the N/MCI contract.

Kevin Lightfoot, a spokesman for EDS, said "nothing has changed since last quarter" regarding the lawsuit and the company's estimates of what effect, if any, it might have on the future of the N/MCI contract.

Financing Extended

Meanwhile, EDS last week said it's extending and expanding the finance vehicle associated with the N/MCI contract.

Under the terms of the new agreement, EDS's line of credit to cover investments in the contract has increased from $600 million to $900 million and has been extended from 2005 to 2007. According to Lightfoot, the $300 million increase matches the current N/MCI equipment deployment forecast.

"This line of credit allows us to accelerate our receipt of cash by selling future receivables to financial institutions to match our cash flow," said Lightfoot. This enables EDS to get paid immediately for hardware deployments, even though the Navy isn't contractually required to pay for the equipment for 60 to 90 days after deployment.

EDS will release its third-quarter earnings report on Oct. 29. **42348**

EDS Extends PLM to Windows Desktops

Product life-cycle tools not just for engineering

BY JAIKUMAR VIJAYAN

Product life-cycle management (PLM) tools — long confined to use in engineering environments — may be slowly headed out of their traditional niche.

Last week, Plano, Texas-based Electronic Data Systems Corp. announced a version of its Teamcenter PLM software that's designed for use in a standard Windows desktop environment.

The product, dubbed Teamcenter Community, offers a range of collaborative capabilities that give users of Windows 2000 and later versions access to product life-cycle information locked up in engineering systems.

With it, more people within an enterprise, including marketing and finance teams, as well as suppliers and partners, will be able to access, visualize and collaborate around product information such as computer-aided design models and drawings, according to the company.

"What this does is to move the world of the engineer closer to the world of the rest of the enterprise," said Michael Burkett, an analyst at Boston-based AMR Research Inc.

Such capabilities can significantly reduce the time it takes manufacturers to bring new products to market, said John Loo, senior manager of technical computing at Callaway Golf Co. in Carlsbad, Calif.

Callaway has tested the product for the past two months and is preparing to deploy it across the company.

Teamcenter Community will enable the sporting goods company's domestic and international suppliers to share product data far more efficiently than is possible with current processes, such as fax, e-mail and postal mail, according to Loo.

Common Portal

With Teamcenter Community, suppliers can log into a common portal from a Windows desktop and access, view and comment on product-related documents. The tool also offers some basic routing and version-control features that will give Callaway more control over shared product documents, Loo said.

"One of the biggest constraints when dealing with international suppliers especially is just the speed of communications," he said. "This is going to help us improve our time to market."

The move by EDS is similar to those of rivals such as IBM, Burkett said. But Teamcenter Community appears to be more tightly integrated with the Windows desktop environment than other PLM products are, he added.

"EDS has put the most effort in terms of extending it to the desktop," Burkett said.

Teamcenter Community is built around Microsoft Office's SharePoint services and will cost companies about $250 per user per year. **42335**

Corporate Execs Try New Ways To Align IT With Business Units

CFOs look to portfolio management, other means of handling IT projects

BY THOMAS HOFFMAN
CHICAGO

Although CIOs traditionally rank alignment between IT and business as a top priority, chief financial officers attending a conference here last week said that closing the gap often requires new ways of thinking — or new personalities in management.

For example, Thomas Williams, chief process officer at AT&T Corp., said poor alignment between the company's IT department and business units "was absolutely an issue" until AT&T adopted a portfolio management approach to IT projects in January.

The new technique, which applies the same Buy, Hold or Sell criteria that financial investors use, lets AT&T evaluate whether the more than 100 IT projects in the pipeline at any given time are meeting their business objectives, such as reduced costs or improved customer satisfaction.

That has made it easier for corporate executives to "make conscious decisions on which investments to stop and continue," Williams said. It also has given AT&T "a regular, repeatable process that has teeth to it" for ensuring that IT projects are aligned with business goals, he added.

Alignment remains a challenge at many companies, based on comments by conference attendees and survey results released by Boston-based CFO Publishing Corp., which sponsored the event. Twenty-two of the 50 chief financial officers surveyed cited weak alignment between IT and business strategies at their companies, while two others said there's no alignment at all within their organizations.

The research, which was funded by Novell Inc., is consistent with earlier surveys of between 200 and 300 CFOs, according to Mary Driscoll, president and editorial director of CFO Publishing's events arm. Novell executives discussed the results during a breakfast session and said the findings mapped with challenges being cited by the company's users. But they didn't pitch the use of Novell's software to help bridge the gap.

To help achieve better alignment, Cisco Systems Inc. assigns an IT and business leader to each technology project and makes them jointly responsible for the initiative, said Dennis Powell, the networking vendor's CFO. "We changed our thinking about IT from a cost center to a strategic partner," he said.

Several CFOs said much of the alignment gap is the result of personality conflicts.

Tom Goldstein, CIO at LaSalle Bank Corp. in Chicago, said the relationship between business units and the bank's IT department "wasn't that great" under its previous CIO. But he added that things have improved since current CIO Sam Halim joined the company. "I trust the guy very much and we share a vision," Goldstein said.

Despite the continuing alignment issues, many attendees were quick to defend CIOs. "Most CFOs would agree that the alignment problem isn't the fault of IT," said Ian Downes, a consultant at Cap Gemini Ernst & Young U.S. LLC in Rosemont, Ill. "IT departments are inundated with requests and often find themselves in reactive mode."

To help guarantee that projects are synchronized with business needs, Downes recommended that IT staffers work stints in departments such as finance or human resources so they can get a better understanding of how those units work. **42353**

What You Should Do

- **Share responsibility.**
- **Set clear,**
- **Build consensus.**

Often, Communication Is a Hurdle

CHICAGO

"If there's any barrier to success between IT and business, it's communication," said conference attendee Randy MacDonald, executive vice president and CFO at Ameritrade Holding Corp.

And although that statement seems like a truism, MacDonald and two other executives who took part in a panel discussion noted how difficult it can be for CIOs and CFOs to speak each other's language.

MacDonald also served as acting CIO at Omaha-based Ameritrade for about a year until the online brokerage hired Asiff Hirji to be its technology chief six months ago [QuickLink 38488]. MacDonald said that during the search process, he was disappointed by the number of CIO candidates "who couldn't talk to total cost of ownership or other [financial] measurements."

Both CIOs and CFOs have to take active roles in ensuring that technology investments hit the mark, he added. If the CIO reports to the finance chief, "then the CFO had better make sure that IT delivers the expected results," MacDonald said.

Randy Stone, CIO at Teradyne Inc., said the Boston-based maker of semiconductor testing equipment makes sure its IT workers understand the company's business strategy. To help in that effort, Teradyne is "reskilling" some IT staffers "to get people better at interacting and working with the businesses," Stone said.

Jones Lang LaSalle Inc. at times has had communication breakdowns between IT and business managers, said Lauralee Martin, executive vice president and CFO at the Chicago-based provider of real estate and investment services.

Communication isn't everything, though. Martin said Jones Lang LaSalle had two CIOs at different times "who could talk a good business game." But they didn't work out "because they weren't technically sound," she said.

– Thomas Hoffman

Vendors Note Demand Shift To Intrusion-Prevention Tools

BY JAIKUMAR VIJAYAN

The mixed results that users have had dealing with intrusion-detection technologies is fueling greater industry interest in intrusion-prevention products.

Last week, Network Associates Inc. announced software designed to help companies not only detect network- and system-level attacks, but also block them more proactively.

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Network Associates isn't alone in releasing intrusion-prevention wares. Last week, Sunnyvale, Calif.-based NetScreen Technologies Inc. announced a "deep-inspection" firewall that combines signature-, policy- and network-behavior-based approaches to block application-level attacks. And earlier this month, Teros Inc. announced an enhanced version of its host-based intrusion-prevention product.

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"We noticed some clear benefits in having invested in IPS when Blaster hit," Kundra said. **42346**

Security Update

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McAfee Entercept Desktop, for detecting and preventing intrusions at the desktop.
Price: $80 per node

McAfee IntruShield 1.8, an enhanced version of the IntruShield network intrusion-prevention product.
Price: not available

Continued from page 1

DNS Servers

ing capacity, said Stephen Crocker, head of the security committee at the Internet Corporation for Assigned Names and Numbers in Marina Del Rey, Calif.

But there are some persistent problems that make the security situation "about the same or maybe a little bit worse as you move down the DNS tree," Mockapetris said.

All 13 of the Internet's root DNS servers — three of which are located outside the U.S. — were victims of a massive distributed denial-of-service attack on Oct. 21, 2002 [QuickLink 33890].

The attacks did little damage apart from slowing down service in some parts of the world. But they were the first to target root DNS servers — on which everything else on the Internet operates — and raised concerns that future attacks could bring down large swaths of the Internet.

Last year's attacks helped raise awareness of the need to bolster defenses, said Suzanne Woolf, senior program manager at the Internet Software Consortium (ISC) in Redwood City, Calif. Like other root server operators, the ISC has over the past year been using a technology approach called anycasting, which is similar to mirroring, to set up multiple copies of existing servers, each with the same IP address.

Anycasting is designed to route DNS queries to the nearest available server in order to mitigate the effects of denial-of-service attacks, explained Crocker.

"It lets us spread out our vulnerabilities and isolate areas as problems arise," Woolf said.

VeriSign Inc., which operates a root server and top-level domains such as .com and .net, has gone a step further.

This summer, the company moved its DNS infrastructure from the widely used Berkeley Internet Name Domain DNS server platform to a proprietary system developed by VeriSign called Atlas. The move was driven by the need to improve the scalability, performance and security of VeriSign's DNS services, said Ken Silva, vice president of network and information security at VeriSign in Mountain View, Calif. Atlas is designed to handle more than 100 billion DNS lookups daily and to eliminate single points of failure.

In the past year, DNS operators and others responsible for Internet safety have also made more of an effort to share attack and vulnerability information, Woolf said.

Just last week, for instance, the ISC opened a new Internet crisis coordination center called the Operations, Analysis and Research Center. Several top-level domains have also begun running multiple versions of their software to ensure that vulnerabilities in one version won't bring down service, Mockapetris said.

But more work remains to be done, he added. Because of the large number of systems involved, top-level domain servers aren't as easy to replicate using anycasting — and therefore remain vulnerable, Mockapetris said. Misconfigured and poorly protected systems among top-level domain operators also pose a threat, he said.

The Internet Engineering Task Force's work on a formal standard and specification for the DNS Security protocol has also been slow. The extension is intended to make it "impossible to supply inaccurate data on the DNS system," thereby eliminating the threat of spoofing attacks, Crocker said.

Olafur Gudmundsson, chairman of the IETF working group in charge of the effort, said it will take another 12 to 18 months for a draft standard to become available. **42344**

DNS Still a Major Target, Creator Says

Paul Mockapetris invented the Internet's core Domain Name System, a highly distributed hierarchical database that provides the translation of Web names into IP addresses, and vice versa. Without it, the Internet as we know it today wouldn't work. In this interview, he discusses the state of DNS security.

Is the DNS safer than it was a year ago? It is more robust at the top. But the bottom layers are a little bit less safe than they were a year ago just because the attack tools have sort of gotten better. The bad guys share their attack tools, and the good guys haven't bought any new technology to beat them, except at the root-server level.

How are root servers safer today? There are just many more copies of the root servers scattered around the world. While you may be able to do a successful denial-of-service attack against one of the servers in Virginia, the other ones in the U.S. and other countries will continue to work. So it's just much more difficult to shut down the whole system.

Why is DNS security such a concern? There was a cybersecurity report that came out of the U.S. government that said the two biggest security issues were DNS and BGP [Border Gateway Protocol]. Part of it is that this is just the place where an attacker has the most leverage.

What new technologies are being developed to improve security? DNSsec [the DNS Security protocol] and digital signature technologies are examples of something that could have an impact. Right now, there's a bunch of opportunities to basically forge data into the DNS, and you don't have any particular way to verify it.

– *Jaikumar Vijayan*

Continued from page 1

RFID

panies that have to meet mandates from both Wal-Mart and the DOD to start putting RFID tags on shipping pallets and cases by January 2005.

Larry Kellam, director of supply network innovation at Procter & Gamble Co., said there would be "a significant cost impact" if the DOD and corporate users don't agree on a common standard. IT expenses would likely increase, as would inventory and product-handling costs, he said.

Kellam added that different standards would also make it harder to meet a goal of reducing the cost of RFID tags to as low as five cents each, the level Wal-Mart wants to see. "Tag costs would still never get as low as with a single, global standard," he said. P&G is among the top 100 suppliers of both Wal-Mart and the DOD.

The Pentagon this month said that all of its 23,000-plus suppliers will be required to use passive RFID tags to help military officials identify and track more than 45 million line items [QuickLink 42033]. That followed a similar edict issued by Bentonville, Ark.-based Wal-Mart to its top 100 suppliers in June.

The military would like to support the EPC standard, said Maurice Stewart, deputy chief of the DOD's Automatic Identification Technology office. But the Pentagon has "embraced ISO standards, because that is the way we do business," Stewart said. He added that many of the DOD's suppliers have already adopted draft versions of the ISO 18000 RFID standards and that those specifications should provide trading partners with plug-and-play capabilities.

> **"Tag costs would still never get as low as with a single, global standard."**
>
> **LARRY KELLAM**, DIRECTOR OF SUPPLY NETWORK INNOVATION, PROCTER & GAMBLE

EPCglobal is a joint venture between Uniform Code Council Inc. in Lawrenceville, N.J., and EAN International in Brussels. Bernie Hogan, chief technology officer at the UCC, said he has a hard time understanding why the Pentagon is "so hung up" on the differences between the two standards this early in the RFID adoption process.

Hogan said the standards will likely converge over time, with the ISO 18000 specifications being incorporated into the EPC ones. He added that the UCC is heavily involved in the development of ISO 18000.

EPCglobal last month released the specifications for an RFID-based EPC network and supporting technology. The EPC standard is much narrower in scope than the ISO's and doesn't take into account the use of different frequency ranges, which the military requires, said Steve Halliday, an analyst at consultancy High Tech Aid in Gibsonia, Pa.

Halliday, who expects a final version of the ISO standard to be released in a matter of months, said that failing to find common ground on the issue would have "disastrous" consequences for the DOD's suppliers and corporate supply chains. **42347**

GM'S RFID PLANS

CTO Anthony Scott expects the auto industry to adopt the technology within five years.

QuickLink 42365 www.computerworld.com

Peregrine's New CEO Talks About Life After Bankruptcy

BY MATT HAMBLEN

John Mutch, *who has been CEO of San Diego-based Peregrine Systems Inc. for just two months, is learning fast what it's like to head a company that has recently emerged from bankruptcy. He spoke with* Computerworld *last week about what's working and what still needs to be fixed. Excerpts from the interview follow:*

How do you distinguish Peregrine from its competitors? We still have a core product advantage. We have best-of-breed [products] in both asset and service-center management. My sense is that our products offer more depth of functionality and are easier to integrate [and] still offer things our competitors do not. Our partnerships with IBM and EDS and our professional services experience provide strong value.

Who are your most formidable competitors? Our competitors are BMC with its Remedy line [acquired from Peregrine in 2002], and we see Computer Associates with its help desk line. But we have strengths and weaknesses against both. Remedy is more of a tool set. CA has very strong breadth across the entire stack of products, but individual components are weak. In an enterprise sale, we typically partner with IBM, and in stand-alone product sales, we use our professional services to differentiate ourselves.

> "I'm not sure we do want Remedy back."

Would you like to have Remedy back? I'm not sure we do want Remedy back. When you consolidate back to your core value, you have the opportunity to do things quickly and well. The complexity that Remedy brought to that process was not helpful.

What areas still need improvement? There are several things we need to look at. We are articulating a very solid product road map that extends the value of existing [products] and makes them more open and extensible, so there's a whole area of delivering on the product leadership and thought leadership.

Another element is pricing. Our company needs to be more flexible in the way we license our products to customers. Over the course of the next 90 to 120 days, you can look for changes we will make to the way we license products that will make it easier for customers to do business.

What do you say to customers who are worried about the bankruptcy? IDC just came out with a share-analysis report showing a $968 million market in calendar year 2002 for problem-management products and said we were No. 1 witb Remedy and No. 2 in the market without Remedy. We also have $50 million to $60 million in unencumbered cash and are operating in a cash-flow-neutral to casb-flow-positive basis. We have new-license growth. We're not hearing that noise level around survivability anymore.

42277

MUTCH MORE

To read our complete interview with Peregrine's CEO, visit our Web site

QuickLink 42237
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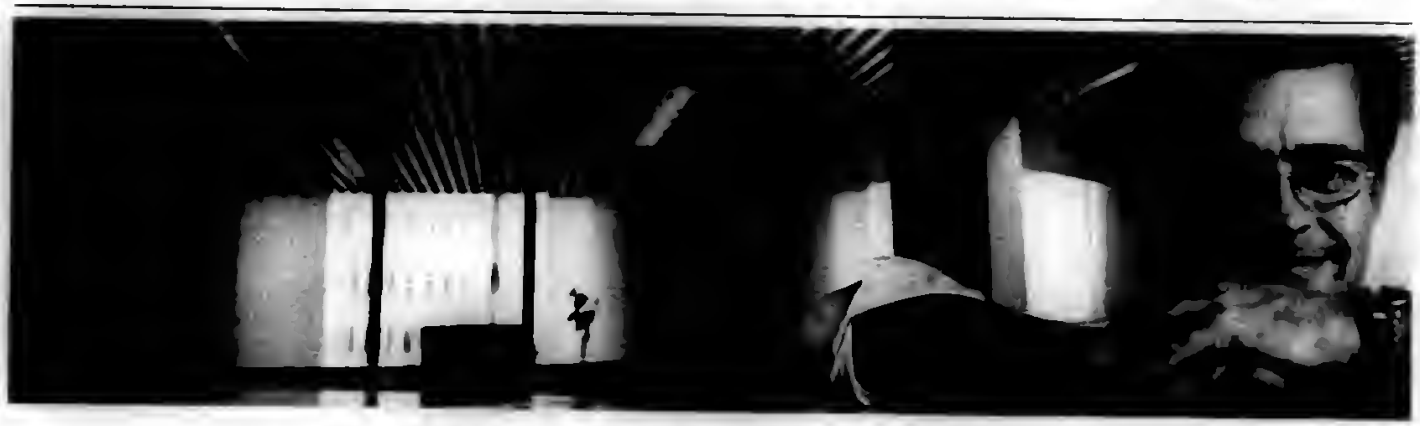

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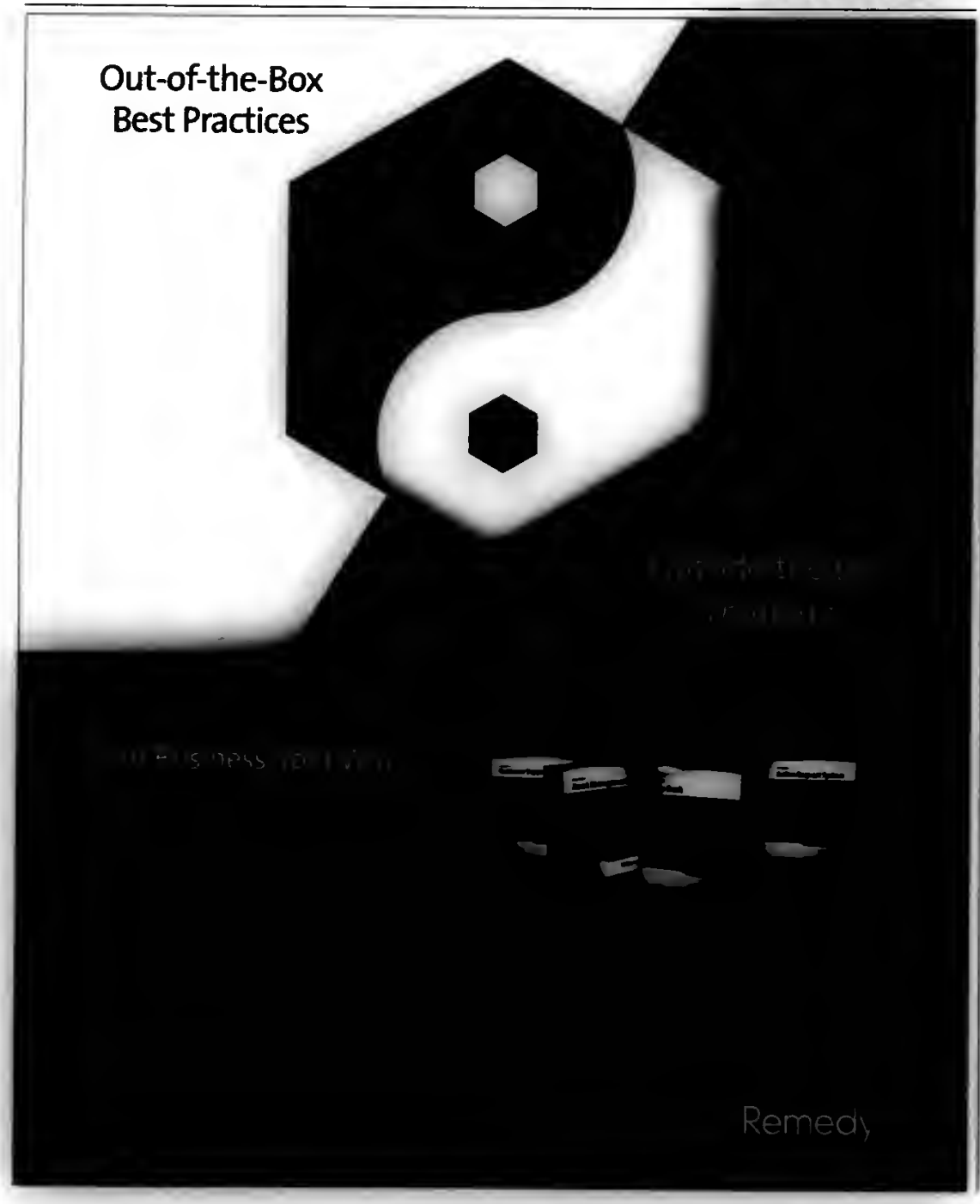
IBM's Mills Sets Software Sights on Middleware, Linux

Steve Mills, senior vice president and group executive at IBM, runs the company's $13.6 billion software business. Last week at IBM's headquarters in Armonk, N.Y., Mills met with a group of Computerworld editors to discuss his middleware-centric software strategy and Microsoft-related security issues. Excerpts from the discussion follow:



You've said that $11 billion of your $13.6 billion software business is middleware. Why the disproportionate focus on middleware? We do that because it's a good business — we have shareholders to satisfy. Middleware has always been important to customers. They need to do transactions, data management, development tools, systems management, security, collaboration.

We continue to invest in MVS on the mainframe and OS/400 for the iSeries platform. There are investments we have to make in support of the hardware platforms — the operating systems are important. But the bulk of the money goes into middleware. And that's where the growth comes from.

How would you characterize your operating system business in general and AIX in particular? The operating system business, which is a multibillion-dollar business for us, in recent years has essentially been a flat business. AIX has been a flat business. We're supporting Linux on the pSeries today, and I think we'll see more and more customers over time decide to run the pSeries with Linux.

Linux will run on a variety of different chip sets; it certainly runs quite nicely on the Power chips. In the future, we'll see more and more customers run Linux on Power instead of running AIX on Power, and to us that's fine. AIX has always been an enabler. All the money in the Unix market has been made in hardware, in middleware on top of Unix, in applications and services on top of Unix. But not in Unix operating systems — that's not where the payback has been.

So is it a matter of shifting your investment from AIX to Linux? We'll continue to invest in AIX probably for as long as I'm on the planet. More and more people, we believe, will choose Linux to run on Power vs. AIX on Power over time as Linux continues to increase in maturity and more and more things run on Linux on Power.

Continued on page 19

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Continued from page 16

So that's a logical progression of usage, and that's fine with us. We'll reach an inflection point where it'll be appropriate to spend less on AIX to enable the hardware.

How much of your attention is SCO Group's lawsuit against IBM getting? Obviously, it gets attention from a variety of people in IBM.

We haven't seen any code that we have taken from SCO. You have to make the pilgrimage to Utah and see this stuff under armed guard or something. I'm not really sure how they do these inspections, but we're not involved in that. It'll all come down to what goes to court.

How are concerns about security affecting customer choices on infrastructure and software? The accumulated effect of virus attacks and worms [has] brought about a lot of anxiety among businesses around the world on the porous nature of their environment and the cost associated with remediating these things when they occur.

Microsoft, for reasons . . . of their technology, which was never designed for this type of interconnected, public-facing Internet environment, combined with the fact that they are an obvious target, has raised all these concerns.

There are no perfect answers. Many of the answers are procedural in nature, and some are technological.

For example, from a technical standpoint, if you have Unix systems facing the public Internet, you have the ability to dynamically change those environments on the fly. Businesses that have Unix systems facing the public Internet are somewhat better off than those that have Windows server systems.

Is IBM doing anything at all to offer alternatives to the Windows desktop? Thin clients, yes — we have a big portal initiative. We recommend to customers every day that they try to move the maximum number of users in their organization to a portal-based environment. The lowest number I've ever heard for thick-client support is $5,000 per user per year — $5,000 to $12,000 [per year in support costs], that's kind of the spectrum. The big cost savings is not in getting off Microsoft Office and going to StarOffice; the big cost savings is, Can I get to a thin client? The cost of the client is tied up in the labor, not in the cost of the client box or the software that runs on it. **42279**

This interview was conducted by Patrick Thibodeau, Tommy Peterson, Don Tennant and Maryfran Johnson.

MORE MILLS

To read the full two-part interview with Mills, visit our Web site:

QuickLink 42261 and 42276
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MARYFRAN JOHNSON

Down, Not Out

THE FIRST TIME *Computerworld* surveyed IT professionals about their salaries was in 1986, the year Chernobyl melted down, the space shuttle *Challenger* exploded and Prince Andrew and Fergie tied the royal knot. Lotus 1-2-3 was the No. 1 business software program, and Microsoft was in fifth place among the software market leaders (IBM, Lotus, Ashton-Tate and Apple). There were 5,000 Internet hosts, vs. about 172 million today.

Seventeen years ago, there were only a handful of IT job functions and titles — computer programmer, systems analyst, information systems manager — rather than the dozens of specialties in the field today. Who could have imagined chief security officers, earning six-figure salaries no less, or "strategic planning" experience becoming a major IT career boost?

The overall number of IT jobs tripled from 719,000 in 1983 to 2.5 million in 2000, says the Washington-based Commission on Professionals in Science and Technology. Yet today the IT labor force is down from that peak by at least 150,000 jobs, the CPST reports, and IT unemployment has reached an unprecedented high of 6% this year [QuickLink 41519].

The somber mood among the nearly 15,000 IT pros and managers in this year's salary survey (see story on page 37 and online at QuickLink 41785) is hardly unexpected, given the flattened pay scales, heavier workloads, longer hours, outsourcing threats and economic pressures affecting nearly everyone.

What I admire most is the stoic, determined streak among our survey respondents, as though someone had posted a "No Whining" sign over the IT department's door. "Money isn't the most important thing about a job to me," said a Unix systems administrator who was laid off, consulted for a while and then found another job. "I'm happy to have found a job so quickly in this economy."

Other IT staffers feel deeply uneasy about the future, however. "I have such a profound sense of paranoia," said one database developer, "I don't think I'd feel secure if the owner came here and gave me the keys to the building."

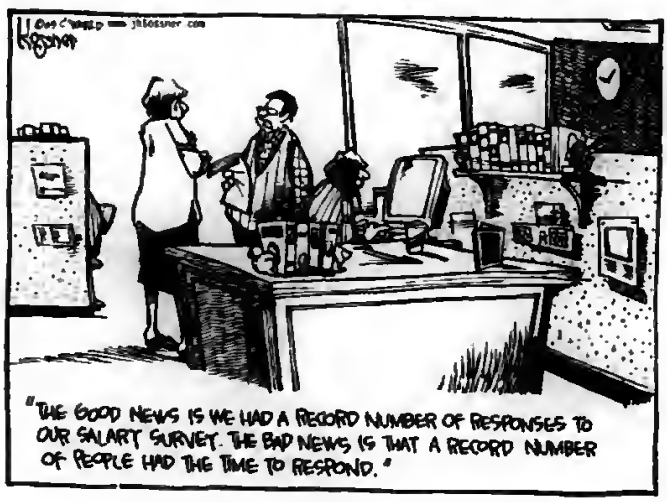
When it comes to the jobs in highest demand, companies are still paying a premium for IT professionals with networking and security expertise, and for experience in Microsoft's .Net technologies. IT architects with strategic planning, resource utilization and business alignment experience remain strongly in demand, our survey found. Backgrounds in portfolio management, process improvement, data mining and business intelligence have also emerged as reasonably hot tickets in an otherwise tepid marketplace.

Some of the salary numbers we crunched are intriguing for what they say about company priorities. Like the parity achieved between chief security officers (average salary: about $111,000) and network directors or VPs (about $114,000). While CSO salaries were up by about 3.4% over 2002 levels, network chiefs warranted an average pay increase of 6.8%.

On the flip side, it was disheartening to see job categories where pay fell (and probably shouldn't have). Example: Quality assurance specialists, who make just shy of $60,000 on average, saw the largest pay decreases (down 5.5%) in the past year. At a time when software quality has never been a more prominent concern for the enterprise, that job is being devalued? Why's that?

Finally, for managers worried about keeping their best people once the economy rebounds, our survey offers up some solid data about the most desired (nonmonetary) perks. Topping the list are additional time off and telecommuting privileges, followed by comp time and more flexible scheduling.

Remember that whole work/life balance mantra? It's still out there, waiting, as we all are, for better times to return. **42307**


"THE GOOD NEWS IS WE HAD A RECORD NUMBER OF RESPONSES TO OUR SALARY SURVEY. THE BAD NEWS IS THAT A RECORD NUMBER OF PEOPLE HAD THE TIME TO RESPOND."

PIMM FOX

Parlez Vous American Business?

THERE'S SOMETHING wonderful (and powerful) about going to Paris and meeting an American entrepreneur who has decided to build simple, inexpensive content management software (CMS) that helps make visiting French museums a rich and energetic experience.

Here's how it happened: When one of Josh Clark's best friends perished aboard American Airlines Flight 11 from Boston on Sept. 11, 2001, he rethought his life and decided to head to Paris to be with his girlfriend, Ellen McBreen, who was pursuing her doctorate on the sculpture of Henri Matisse.

But what would he do there?

Clark had previously built Web sites and worked for consulting firms but was frustrated by overengineered and expensive CMS products that weren't friendly to small and midsize businesses.

So he started his firm, Global Moxie, and built his own CMS in his Paris apartment using Perl. At the same time, McBreen, who was repeatedly being asked to show visiting friends the glories of French art, decided to create ParisMuse.com. The idea is to offer English-speaking museumgoers the chance to connect with private guides (graduate students with a love and knowledge of art), to eliminate the pain and ignorance from a trip to the Louvre.

ParisMuse.com, which started in May 2002 with McBreen and one other "muse," became a client of Clark's server-based software, dubbed BigMedium.com. With minimal technical skills, McBreen (who now has six muses and offers multiple museum tours) can manage the daily workings of her Web site with basic style sheets and a variety of components, such as e-mail and XML content. "The goal is to make Web publishing easy and affordable and to give writers con-

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A Quest for the Holy Grail — Deriving Business Value from Your Storage Investments

Part 1

The Battle to Enable Business, Control Storage Costs and Minimize Risk

October 27, 2003

SNIA

The Battle to Enable Business, Control Storage Costs and Minimize Risk

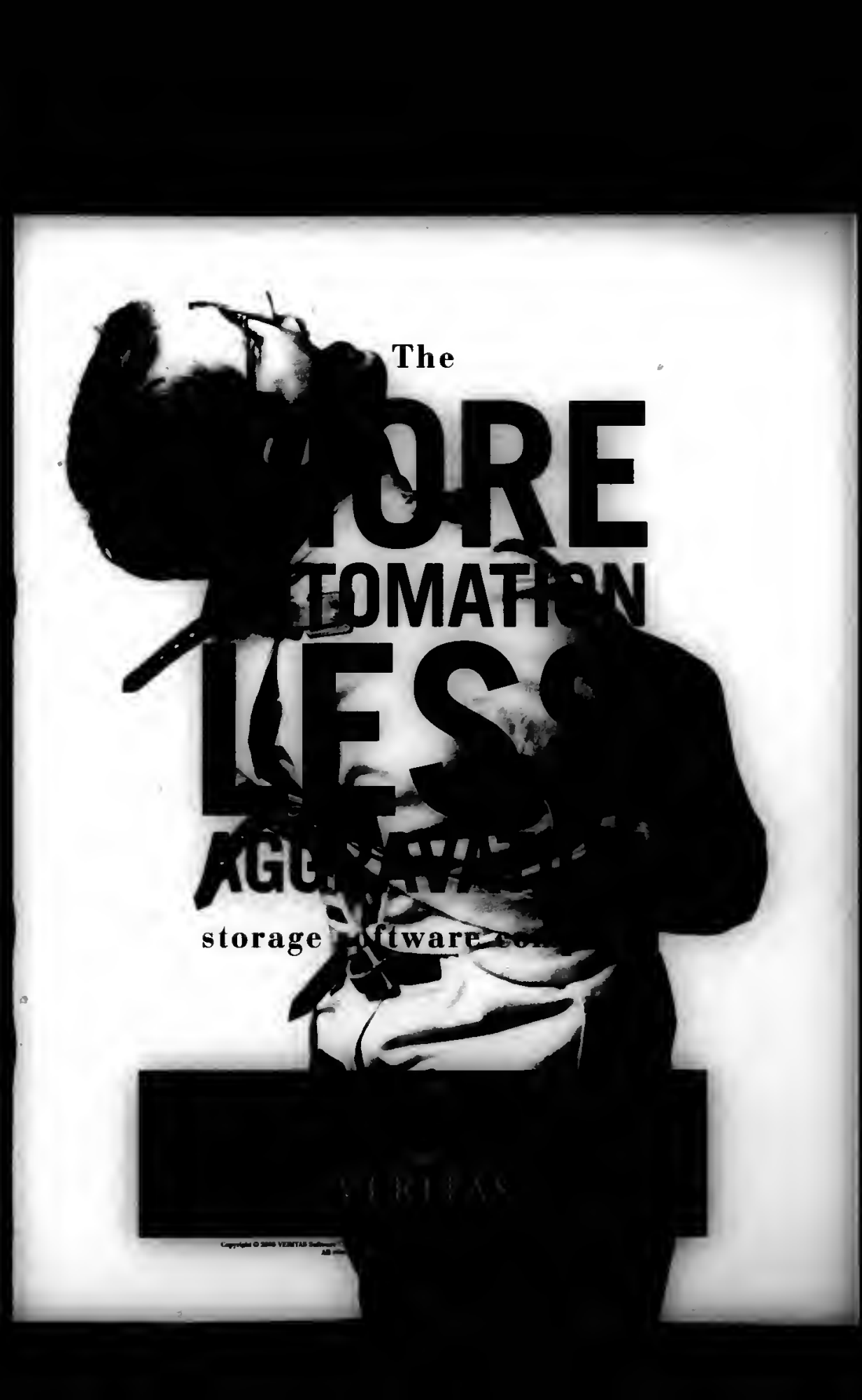
By Jon William Toigo

Presented with industry statistics that show disk media capacity climbing at a rate of about 120% per year and price per gigabyte declining at approximately 50% per year, many IT managers have found themselves pondering the question, "Why is data storage the single largest expenditure in my IT budget?"

In many cases, they answer the question with a cursory survey of their own business environment, concluding that their storage investment is growing because, simply put, there's more data to store. Confirming this assessment are industry statistics quoted in the marketing materials and trade prese commentary arguing that we are in the midst of an unprecedented "data explocion." Many point to an ongoing University of California at Berkeley study of data growth to justify their view.

The UC Berkeley study, eponsored by EMC Corp., achieved notoriety in 2000 by announcing that the sum total of all the digital data generated by humanity from the dawn of the computer era through the Millennium would double in 2002. Data volumee were expreseed in tens of "exabytes" – beyond our capacity to conceive in any concrete way. With such claims about data growth, it is little wonder that eome IT managers have concluded the data explosion is an irresistible force, a tsunami of information they're powerless to do anything about.

The upeide of this phenomenon was that burgeoning data confirmed the general success of IT efforts to enhance businese productivity with automation. The downside: like death and taxes, the growth of storage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For most companies, storage is the single largest expenditure in the IT budget — understandable, given both the rate of data growth in contemporary businesses and the lack of open standards, which impedes efforts to develop universal storage management and automation technologies that can let fewer administrators manage more storage capacity efficiently. To attack this cost-effectively, a combination of technical knowledge, performance engineering and business process-centric management is required.

This four-part quarterly series, written by Jon William Toigo, independent consultant and author, will help senior IT management, IT professionals and enterprise business management cope with the overwhelming amount of market information, communication and messaging. Equipped with this common-sense method for assessing, specifying, testing and deploying storage as a blueprint, they can then design and implement a truly business-supportive storage architecture for their organizations. Armed with a set of guidelines, best practices and tools, IT professionals will be able to rise to the challenge and derive measurable business value from their storage investment.

Find additional resources at Computerworld's Storage Knowledge Center at www.computerworld.com/hardware-topics/storage and at www.snia.org, the Storage Networking Industry Association's Web site.

to be paid for all the contributions made to the organization by IT.

IT managers who reach this conclusion tend also to curtail any further investigation into the root cause of increasing storage expense. Since the cause of storage growth is beyond their control, they shift their efforts toward the discovery of tactics and technology to cope with the situation. "Managing capacity" has become synonymous with storage management. A popular strategy for avoiding the dreaded "Disk Full" error message has been to purchase more capacity than applications needed.

A few managers, however, are not satisfied with the pat explanation embodied in refersnces to the data explosion. A few have actually visited the UC Berkeley Web site and discovered that the story of data growth cited in brochures is actually a very selective reading of the findings.

For example, according to Berkeley researchers, most data growth isn't attributable to corporate information systems, but rather to personal computing and media companies that sell books, movies and music on digital media such as CD-ROMs and DVDs.

While there is doubtless significant growth in the volume of data amassed by most businesses, especially with the advent of the business Internet and e-mail, the truth is that this is not the real meaning of the data explosion, which the Berkeley researchers instead attribute to the "democratization of data." Business data growth is a comparatively small subset of data growth as a whole, perhaps as little as 20%.

Looking deeper

Some IT managers have probed more deeply into the storage cost conundrum. In so doing, they have inadvertently joined what could be described as a quest for the holy grail of business value in storage investments.

Like its predecessors in history and literature, this quest is filled with high adventure, daunting challenges and seemingly insurmountable obstacles. (Okay, maybe "high adventure" is an exaggeration.)

The first problem the inquisitive manager typically discovere is that he lacks information on real data growth occurring within the IT infraetructure. Without understanding the data that is currently being stored or the applicatione that are generating it, it's impossible to estimate growth rates and future capacity requirements. More importantly, without understanding data access characteristics, retention requirements and protection requirements, it's impossible to make optimal use of capacity. Companies have a tsndency to store infrequently accessed or modified data on their most expensive storage arrays.

Many managers believe storage cost is the price that has to be paid for all the contributions IT makes to the organization.

Managere may have some insight into the amount of storage they have deployed, and perhaps how much raw capacity is currently available. The meaning of this data is unclear, however, and its usefulness in describing data growth is limited.

To support a valid assessment of data storage efficiency, managers must consider two metrics: capacity allocation efficiency and capacity utilization efficiency. The first has to do with how efficiently storage capacity is provisioned to the applications that need it. The second metric refere to the optimal placement of data on platforms in the infrastructure based on the access and usage characteristics of the data and the cost of data storage platforms.

There is a dearth of software tools designed to provide this kind of data on data. Unfortunately, data itself does not currently carry this information around with it. In other words, data is not self-describing because operating systems and applications have not been created to equip data with a self-descriptive header that could be used to quickly and effectively describe its storage requirements to management applications.

Rocket science

In the absence of self-describing data, IT managere must sift through stored data manually in order to assess its epecial handling requirements and growth trends. Once this is done, managers must develop techniques for categorizing data and for subjecting data of different categories to different

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management policies and processes.

Unmanaged or poorly managed storage capacity is a key factor in the huge labor cost component of storage total cost of ownership (TCO). Without effective management, the most storage a single administrator can handle is 500 to 700 gigabytes, according to analysts. It is substantially greater if the IT manager deploys a homogeneous infrastructure – one in which all storage components are purchased from a single vendor or vendor cadre.

Usually, this increased administrative capability is a function of a set of management utilities that enablee the management of multiple instances of the vendor's array products from a eingle console. (In fact, much of the hype about the labor savings of Fibre Channel SANs derives not from including storage in a Fibre Channel fabric, but from building an infrastructure using a eingle vendor's gear and using that vendor's management console to administer the homogeneous platform.)

For many years, storage hardware vendors have used this claim to discourage "promiscuous purchasing" by companies and to seek exclusive deployment of their own equlpment. Some companiee have gone this route in order to better control labor costs and the downtime that often accompanies unmanaged or poorly managed heterogeneous storage (infrastructures built using different vendors' products).

Of course, homogeneous infrastructure also carries the potential drawbacks of vendor lock-in. Customers who go this route tend to trade off the ability to leverage best-of-breed or innovative technology not provided by their preferred vendor. Pricing advantages available

from competing products may also be sacrificed at the altar of management efficiency through homogeneity. Ultimately, the labor cost-savings benefits derived from homogeneity may erode if management utilities do not scale as additional storage is deployed over time. And many management utilitiee do not scale at all well.

Hitting the limit

Historically, even homogeneous etorage models have hit growth limits. In the late 1970e, a survey of the GUIDE user group reported that eystems programmers could manage only 11 megabytes of data in an IBM mainframe environment, perhaps the most homogeneous environment ever fielded. The result so concerned IBM (because it suggested that labor costs might inhibit the eale of additional direct access etorage devices, or DASD) that the company initiated the development of a technology called Systems Managed Storage (SMS), which was later productized as DFSMS. The vendor's approach focused on characterizing logical and physical storage elements and, with a hierarchical management system, migrating data through varicus classee of storage until it was either permanently deleted or archived to tape and removed from production DASD.

SMS classes were open-ended, letting customers make determinations about data categories that were appropriate for their environment. In shope that fully exploited SMS technology, the initial provisioning process (the initial allocation of storage and storage-related services made to the data generated by applications) was simplified. Further capabilities provided in IBM'e hierarchical storage management (named DFHSM) facility enabled the automation of data movement from memory to disk and ultimately to tape based on accese frequency and clase description. The result: a single administrator could manage much more storage using SMS.

These benefits still accrue to homogeneous mainframe-centric storage. Analysts say that mainframe DASD in a shop where SMS has been fully implemented exhibits capacity allocation efficiency between 60% and 80% of optimum. That means most of the etorage capacity ie efficiently allocated to applicatione on a dynamic basis.

Inquisitive IT managers discover they lack information on real data growth occurring within the infrastructure.

By comparison, analysts say the heterogeneoue storage in UNIX and Windows environments demonstrates a poor capacity allocation efficiency of approximately 40% of optimal, while Linux environments hover at a paltry 30%. The reasons? First, the heterogeneity of storage itself. Also, the lack of an SMS-like management facility in the distributed systems world.

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inhibited by many factors. One has been the lack of ready accees to etorage devices in server-captive or direct-attached configurations. SANs have targeted this shortcoming by connecting the etorage behind servers in a switched fabric.

A second inhibitor has been the proprietary architecture of storage arrays themselvee. Most redundant array of independent disks (RAID) manufacturers have implemented proprietary small computer system interface (SCSI) initialization strings and other "features" deeigned as much to stymie interoperability with competitors' equipment as to enhance the performance of their own.

A third inhibitor has been the lack of effective standards for storage in general. Where etandards have been articulated, such as SCSI and Fibre Channel, they've often been defined so as to help vendors implement the letter of the standard and not produce interoperable equipment.

A fourth inhibitor is the rslative lack of attention that has been dedicated to developing management software for distributed storage, and the lack of priority placed on manageability by those purchasing storage hardware. For at least a decade, companies expanded storage infrastructure with little attention paid to its underlying allocation efficiency or labor cost component. "Forklift upgrades" were considered far easier than figuring out ways to better manage the capacity on hand.

Only as the economy elowed and the "do your best with what you have" mantra gained urgency was the need for improved capacity allocation and utilization efficiency underscored. The proliferation of management software developers is a response to the newfound awarenees of the importance of storage management.

Of course, the storage industry does not see the current resurgence of interest in storage management through the same eyee as IBM in the late 1970e. The need to improve capacity management capabilitiee is rarely contextualized by array manufacturers as a need for a heterogeneous management syetem, but rather as an opportunity to gain market ehare. Still missing is a driving force to compel cooperation in storage management solutions.

To create data classifications, you must first develop a thorough understanding of the applications that create data.

To date, progrees made by induetry aseociations and etandards groups has typically occurred in response to a credible threat that one vendor's proprietary management software product might position it as a de facto leader in the industry. When such a threat has emerged, other vendors have rallied around "open management approachee" such as the Common Information Model/Web Based Enterpriee Management (CIM/WBEM)

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model. Initiatives are quickly abandoned whsn the threat erodes.

What is missing from industry dynamics is a compelling motive to cooperate in developing a universal etorage management approach.

There is another potential driver of storage vendor cooperation, however: operating system and database vsndors. Microeoft Corp. and Oracle Corp., for example, articulated strategies for replacing file eyetems in favor of object-oriented databases. Thess vendors control or influence the preponderance of Windowe and UNIX operating environments. Ultimately, their requiremente dictate many of the platform requirements (including storage topologiee and hardware architectures) in the distributed computing world. By deeignating requirements, then listing supported hardware configurations, these companiee could effectively dictate which storage products could be used by their customere.

There'e anothsr way Microsoft and Oracle could actually facilitate the introduction of a system of self-describing data; comparatively little work would be required to add a layer of data classification and data handling instructions to objects in a database. Storage management in the distributed world could then become more like data management in the mainframe world (Figure 1).

Developing a syetem of self-describing data is one of the prerequisites for the next evolution of storage management: data-centrio management. Current industry discuseion about the topic of information lifecycle management alludee to a data-centric management model and underscoree its importance in achieving not only capacity allocation efficiency, but also capacity utilization efficiency.

Unfortunately, early architectures described by storage vendors tend to be proprietary in nature; disruptive to implemsnt; and limited in their granularity of data classifications, level of automation and support for equipment not supplied by the vsndor.

Prerequisites

Truth be told, the creation of a data classification or data naming convention ie the second of three prerequisitee for data-centric management. The first prereq-uieite ie application and platform knowledge.

So far, most standards efforts have been responses to credible single-vendor threats.

To create data classifications, you must first develop a thorough understanding of the applications that create data. Data criticality, for example, is derived from application criticality, so knowing which data needs to receive which type of prioritization in a disaster-recovery situation requires a knowledge of the application. Application criticality will play a large part in determining whether the data requiree real-time duplica-

tion and instantaneous restoration, or whether it can be recovered later.

Applications also determine the retention, security and accessibility requirements of data. Understanding and documenting these requirements can lead to the creation of an effective set of policies for provisioning.

Finally, understanding the purpose of applications and their interrelationship with each other may help you determine whether data is actively used (frequently updated), passively used (as a reference that must be retained online) or rendered useless over time. These characteristics can be classified to facilitate both storage resource provisioning and migration over time.

In addition to application knowledge, you must build a knowledge-base of storage resources and services, as well as their costs. This information helps ensure that infrequently changed or accessed data is not stored long on your most costly arrays.

The third and final prerequisite for data-centric management is a data movement engine. Having defined data classes and storage classes, some mechanism is required to act on the data and move it from platform to platform. "Policy" is the buzzword used to describe such a mechanism, but policies are actually the instructions to the data mover.

The data movement engine may be similar in design to mainframe SMS. Using access counts, frequency of data use can be collected and, together with the data self-description, interpreted by a policy to determine whether data migration is appropriate. This is not the same as conventional HSM software, which moves data from platform to platform based on the date it was last modified. As the name implies, an access frequency-based approach initiates data movement based on access frequency and other characteristics communicated by the data itself as a function of its self-description method once these inputs are correlated by the policy engine.

The application and platform knowledge-base; a data description method; and a policy engine and access-frequency based data movement engine are key ingredients of data-centric management. An effective management solution integrates these components to provide automated provisioning and

Figure 1: An approach to making data self-describing

Source: Toigo Productions

lifecycle migration of storage. In turn, such a system enables real business value to be obtained from storage investments.

Such a system may still be years away – or it may be coming soon, given the timeframes for the introductions of Microsoft's next-generation Windows client (dubbed "Longhorn"), Oracle's 10G databases and other products. However, IT managers who are concerned about addressing the root causes of storage cost can begin today by:

1. Taking an inventory of applications and getting to know the characteristics of the data they produce.

2. Taking an inventory of storage platforms and available resiliency, security and data protection services.

3. Articulating policies for data management based on the above.

4. Developing a strategic data management plan and sharing it with preferred vendors to let them know how you want to evolve your infrastructure.

5. Setting manual policies and best practices to guide storage design and platform selection – making manageability a prerequisite in product acquisition.

6. Implementing policies to cull stale and contraband data from your infrastructure.

7. Determining appropriate capacity limits for business units and formulating service levels appropriate for each application and its data.

8. Formulating and sharing your classification scheme with internal and external experts to facilitate its implementation within an acceptable timeframe.

9. Implementing a data protection scheme today, if you do not already have one.

10. Educating yourself and your team on the latest developments in database object systems and creating a change management system to stay apprised of new applications and changes to existing ones.

With these 10 steps, you will be well on your way to leveraging the capabilities of data-centric management as enabling architecture and new software tools roll out. ❁

Jon William Toigo, Industry Analyst

Jon William Toigo is CEO and Managing Principal of Toigo Partners International LLC, an independent consultancy and analysis firm focused on providing actionable guidance to IT decision makers. He is also chairman of the Data Management Institute LLC, a professional development organization for those who design, plan, manage and administer storage infrastructure and data assets.

Toigo is a 20-year IT veteran who has worked both as an operative within corporate IT departments and as a senior consultant with two international systems integrators. He is also a prolific writer with 13 books and over 1,000 articles in the technology trade press to his credit. His technology columns in popular print and online media garner a loyal readership of over 800,000 per month.

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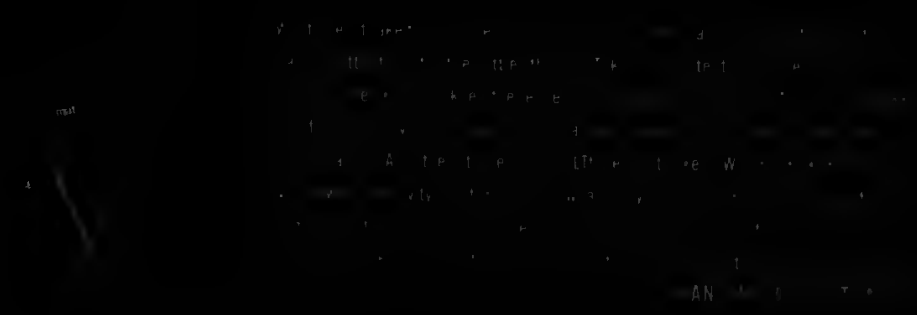

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trol over their sites," says Clark.

Some of the clients now using BigMedium.com include The Salvation Army U.K.; Promenades Gourmandes, a Paris cooking school; and a short-hop airline on the Pacific island of Vanuatu. Priced at $129 with unlimited seats and unlimited accounts, BigMedium.com supports Unicode characters and runs on Unix and Linux machines. A Windows release is planned. The pages served up by BigMedium.com aren't dynamic, but as Clark points out, most sites don't need pages to be rebuilt from a database each time they're accessed. "The software is meant to be gentle on servers," he says.

He says he has been able to improve his CMS by integrating other Web-based technology such as discussion forums and payment tools.

Clark has proved that CMS can be effectively molded to solve specific business problems at very low cost. Now if only it could teach me French. 42239

DAN GILLMOR

Competitors Push Intel And Help IT

THERE WAS GOOD news for Intel, the chip-making giant, when it reported excellent earnings this month. Then Advanced Micro Devices reported results that were much better than Wall Street had expected.

The earnings news was, in a sense, even better for computer users than for high-tech investors. Along with a series of recent announcements from competitors in the semiconductor business, we are seeing signs of a competitive market in an arena where many people have feared Intel might gain an outright monopoly.

The first favorable indicator for customers might be called "the Google effect." This has nothing to do with searching the Web, but rather with Google Inc.'s own infrastructure. Google doesn't run the latest and greatest servers with the latest and greatest microprocessors; it uses cheap, vanilla boxes with older processors in a vast parallel Linux array that gives the company an enormous bang for the buck. The lessons for IT — and the competition — are obvious.

Then there's AMD's continuing ability to hang in there despite the odds. No company has done more to push Intel to improve its products and moderate its prices. Most recently, AMD's 64-bit technology, backward-compatible with the 32-bit era, looks like a smarter decision next to Intel's less-compatible Itanium. In general, AMD deserves the thanks — and some of the business — of IT buyers as a result.

Transmeta and Via Technologies remain competitors at the edges, too. Their competitive impact has been substantially less than Intel's in terms of affecting chip prices. Rather, they push Intel's engineering team. Intel's more efficient processor for mobile use stems, at least in part, from Transmeta's technology initiative of several years ago.

And don't forget that Sun Microsystems keeps improving its Sparc technology and that IBM's PowerPC architecture has made huge strides (including the G5 chip that powers Apple's latest and definitely fastest computers).

Intel's own sensitivity to antitrust rules may also have played a role. Unlike its partner in the Wintel alliance, Intel has always known where the line is drawn between competitive actions and lawbreaking, and it has tended to stay on the right side.

This isn't to say that Intel faces serious trouble because it's confronting real competitors. Its recent financial results vindicated the company's decision to invest heavily in new chips and processes during the worst technology recession in anyone's memory.

Nor is it to say that Intel has always behaved in perfectly ethical ways. A long history of extremely hard-nosed tactics has created many enemies and detractors. But real markets, even flawed ones, are better than monopolies.

That lesson, sadly, continues to vex IT and other customers on the desktop software side of the industry. But even with that actual monopoly, some cracks may be appearing at the edges.

Governments, in particular, have forced Microsoft to alter its pricing policies. In Thailand, it's selling a Windows and Office package to a government-sponsored computer initiative for an amazing $40. The company offered a dramatically lower price to the government of Munich, Germany, when a serious Linux alternative emerged; in the end, the city went with Linux.

This doesn't offer as much hope as it might, given Microsoft's history and its deep pockets. I hope IT departments will start using their leverage, however tenuous it may be. Meanwhile, we can thank hardware competition for lower prices and the choices we do have. 42241

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READERS' LETTERS

Offshore Outsourcing Outrage Still Burns

IN THE ARTICLE "Bush Administration Won't Impede Offshore Outsourcing" [QuickLink 41662], Commerce Department official Chris Israel says, "The answer to economic challenges is growth and innovation." I would appreciate it if Israel would advise me in what field I should have my sons innovate. I would like to see them become innovative sometime between now and filing bankruptcy for their college loans.

Katherine Handshue
Pittsburgh

I PROBABLY STAND to the right of Rush Limbaugh, but President Bush has just lost my vote.

Pete Self
Senior systems engineer, St. Louis

WHEN MANUFACTURING began the offshoring process a generation or more ago, there was a new economic sector ready to receive those who had the money and initiative to retrain themselves: the technology service sector. I would ask the Bush administration exactly what sector is opening up now to accept all of us who have invested a lifetime in IT, besides becoming a clerk at Wal-Mart. Oh – I can join the Army! Now there's a job that won't get offshored. (Right?)

Peter Jespersen
Application integration architect, Beaverton, Ore.

AS LONG AS the president and Congress continue to subsidize business through the H-1B, L-1 and other job-related visa programs, they are *not* sitting on the fence as described in your article, but are actively promoting the loss of jobs.

Jim Franz
Programmer, Greensboro, N.C.

Offshoring Needn't Be the Only Option

FRANK HAYES delivered solid advice for handling application shortcomings ["Ugly Screens," QuickLink 41543] until the final "ship it overseas" zinger. Seeking outside assistance need not mean immediately going offshore. Common sense and recent press indicate that executive management will eliminate the internal application development team if they even *think* they aren't getting their money's worth from them.

Hasty decisions have long-term consequences. Permanent losses of not just IT jobs will be a hot-button issue long after Enron fades into memory. Please revisit this issue in a future column.

Anson Kenley
Abilene, Texas

The Visa Data Isn't The Real Problem

THE REAL PROBLEM with the GAO's efforts to count H-1Bs isn't the lack of data; it's the lack of desire to have any data ["Data Problems Thwart Effort to Count H-1Bs," QuickLink 41884]. If the government really wanted good numbers regarding this program, lawmakers would have put some teeth into the original legislation that required the INS and Labor Department to properly track H-1B and L-1 visa holders. Now, lacking good information, it's easier to justify extending the program. At testimony last month before the Senate Judiciary Committee, advocates of the program were brought in to tell about how much this program has done for U.S. competitiveness. Were any American workers who have been shoved out of their jobs brought in? No! Instead, we heard how it's helping Intel hire semiconductor physicists. The GAO had the opportunity to talk to real Americans who have been displaced by H-1B and L-1 visa holders, and they declined because they felt that these stories were anecdotal. What could be more anecdotal than the stories that companies have given to Congress about why they need this program to continue?

Walter Crosby
Danvers, Mass.

COMPUTERWORLD welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. E-mail: letters@computerworld.com. Include an address and phone number for immediate verification.

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FUTURE WATCH

Software Bugs On the March

Efforts are under way to improve tools for testing and evaluating software. But it will take more than better bug fixers. **Page 32**

SECURITY MANAGER'S JOURNAL

Hidden Vulnerability Dogs VPN Project

An unforeseen firewall software defect leaves remote users in Vince Tuesday's company vulnerable — and keeps a VPN off-line. **Page 34**

OPINION

Send in the Exterminators

Tommy Peterson says that automated development and best practices will help, but software bugs won't be eliminated until users take their bite seriously **Page 35**

KeyCorp

Wins Mirroring Marathon

After two years of stops and starts, the bank's interstate remote data-mirroring project is finally online and has cut disaster recovery times from 72 hours to 12. **By Julia King**

KeyCorp
Cleveland

GOAL

■ Upgrade disaster recovery capabilities to be back in business within 12 hours of a disaster, with near-zero data loss.

RESULT

■ KeyCorp is mirroring between 6TB and 8TB of data between its data center in Albany, N.Y., and an IBM facility in Gaithersburg, Md. In a test, the bank was able to recover its mainframe in under 12 hours with only milliseconds of data loss.

"DATA MIRRORING IS LIKE TEENAGE SEX. Everybody says they're doing it, but they're not." So says Charlie Miller, head of data center engineering at KeyCorp, which learned that lesson the hard way over the past two and a half years.

The Cleveland-based bank's data-mirroring odyssey began in the fall of 2000 with a seemingly straightforward business decision to upgrade the disaster recovery capabilities for its entire mainframe production environment, including its online banking system. At the time, the bank's best-case data recovery scenario using an in-place tape backup system was close to 72 hours, with one to three days' worth of data loss. KeyCorp's goal was to be back in business in 12 hours or less, with near-zero loss. That made remote data mirroring the only technical option.

FIELD REPORT

"Technologically, it's a pretty simple concept," says CIO Robert Rickert. "At the same time that an ATM or other transaction comes through, it's written to our disk [at KeyCorp's data center in Albany, N.Y.], and then so many milliseconds later, it's written to a disk down [at an IBM disaster recovery facility] in Gaithersburg, Md. If something blows up in Albany, you flip the switch, connect up a processor, and you're ready to go."

But as Rickert and other KeyCorp officials discovered many times throughout the project, there can be huge gaps between technical concept and reality.

For starters, "there were allegations — by all of the [bidding] vendors — that there were a lot of people doing data mirroring, but we had trouble finding people doing even a rudimentary variation of what we were trying to do," says Miller. Plenty of financial services companies mirror data between data centers in New York and disaster recovery sites in other parts of Manhattan or in New Jersey, for instance. "But we were trying to go 500 miles, and at the time, we had 9TB of data and our write I/O was 100MB/sec.," Miller says.

IBM's Extended Remote Copy (XRC) mirroring technology, which KeyCorp ultimately chose to implement over offerings from Hopkinton, Mass.-based EMC Corp. and Tokyo-based Hitachi Ltd., was also much less mature and less stable than KeyCorp officials say they were led to believe. On the other hand,

KeyCorp
Wins Mirroring Marathon

the bank said it underestimated the undertaking's complexity and didn't take full advantage of some resources that could have helped during the rollout. As a result of those issues and KeyCorp's lack of experience with the new storage technology, it took more than two years — a year longer than expected — to complete the project.

During that time, KeyCorp suffered at least three mainframe crashes and reboots, several production-system outages, agonizing software-tuning problems and a self-imposed project "chill period." KeyCorp then solicited a second round of bids from vendors, including IBM, which had won the original contract in part because it had agreed to also provide the implementation services that KeyCorp needed to set op and run the data backup system.

Making matters worse was the fact that the project had oo return oo investment. "This was really an insurance-policy type of project and not a project that would result in financial savings," Rickert explains.

The good news is that today, after reaffirming its choice of IBM in a second round of bidding, KeyCorp is io full production with a new backup system consisting of IBM Shark DASD (direct-access storage device) disk drives with XRC mirroring technology at both the bank's data center and IBM's disaster recovery facility. Five dedicated OC3 lines link the two sites, with KeyCorp mirroring between 6TB and 8TB of data — the equivalent of millions of transactions per day.

The bank ran a disaster drill last summer to test the system and was able to recover its mainframe environment in under 12 hours with "milliseconds of data loss," says Rickert. KeyCorp has set a data-mirroring delay threshold of five minutes for the Gaithersburg site. After that, the mirroring system must suspend cleanly and write data to a different backup system rather than slow down and stall the mainframe production environment.

Key Problems

But getting to this point wasn't at all easy, according to everyone involved with the project. KeyCorp encountered several thorny problems along the way, but the IT team was able to solve them.

KeyCorp's tape backup system was set up to restore critical applications, such as core accounting systems, on a priority basis in the event of a disaster. Back-office systems were secondary. But with the advent of online banking and other real-time, Internet-based transactions, "applications we thought were less critical had feeds into the more critical applications," says Rob Bellanti, vice president of data center engineering. Yet mirroring all of the data would be expensive and slow down the entire system.

KeyCorp solved the problem by configuring the XRC mirroring software based oo data set characteristics. Data files characterized as temporary work files and report files, for instance, are excluded from mirroring.

Synchronizing the IBM DASD drives in Albany and Gaithersburg was a major problem. The data files to be written in Gaithersburg would back up in the queue, accumulating in a 16GB cache system at the IBM facility. This triggered KeyCorp's production system in Albany to slow down and crash, forcing an initial program load — the mainframe equivalent of a reboot.

"That's a pretty serious eveot when you have to take down your mainframe, esseotially hitting Control-Alt-Delete," Rickert says. "We'd have to break the mirror for a while when tuning [of the XRC software] would be done. We'd revert to tape wheo the mirror was broken. We never stopped doing tape backups, because we wanted to have at least six mooths where this thing worked perfectly before we'd give op doing tape backups."

The Right Choice

In April 2002, KeyCorp conducted the first test of its mirrored environment, which confirmed that it had selected the right technology. "It was the first time our line-of-business and applications groups were able to access mirrored data to make sure it looked like the data at home [in Albany] looked, and it did," Trent says. "The test actually cemented the fact that the concept of mirroring was going to work and achieve our desired business goals."

Nevertheless, KeyCorp then instituted the chill period and a second bid solicitation from vendors because the IBM system repeatedly and unexpectedly suspended data mirroring as a result of what later was discovered to be improperly set performance parameters. Suspeoding the mirror caused the bank's mainframe productioo system to slow down, which in turn made critical services, such as Internet banking and automated teller machine services, unavailable to customers. "The solution was right, but the tuning was off," Trent says.

Miller says two factors had to be addressed. The first was properly configuring and sizing the system's hardware. The second was determining tbe right parameters for how much slowdown the system would tolerate in the production environment before suspending the mirror.

IBM project manager Esperanza Murdock, who was brought into KeyCorp after the two-month chill period, attributes many of the bank's problems to the inherent complexity of data mirroring coupled with a lack of communicatioo between IBM and KeyCorp officials at the outset of the project.

"There was a preconceived ootion that this was a turnkey solutioo as opposed to an integration project," Murdock says. "On a large-scale project like this one, there are so many pieces to the puzzle. A big piece is the network, but there also are the storage machines, the connectivity betweeo machines, the automated software and the resources available. At the beginning of this project, there wasn't a level set of requiremeots and expectations and what the solution was all about."

To solve the problems, KeyCorp and IBM made several changes. First, they doubled the capacity of the cache system to 32GB. They also increased the number of data movers — the systems in Gaithersburg that poll the bank's mainframe environment in Albany for data updates — from four to five. And they added another OC3 channel to increase data throughput. The two companies also implemented IBM's Geographically Dispersed Parallel Sysplex (GDPS) software tool to automatically manage the data movers and the XRC environment. This eliminated the need for operators to manually enter and change commands, which in turn eliminated the possibility of buman error.

"Once we brought in the GDPS software and took advantage of their automation constructs, we suspended a lot less," says Trent. "Before, we conservatively set the thresholds too low, and it would trip the system, and the mirror would suspend, and it would take a few hours to figure out why we'd suspend, and we'd have to talk about the best time to resume the mirror without problems."

In retrospect, "we hadn't really done our homework and gooe to IBM's Red Book," a compendium of user experiences that IBM maintains for each of its products, Trent says. "We found ourselves reinventing thresholds and parameters that were already denoted by other implementations of the [XRC] software. We should have paid more attention to those things upfroot. We all like to look at our own environments as if they're unique."

Because of the inherent complexity of data mirroring, Phil Poresky, an analyst at GlassHouse Technologies Inc., a research and consulting firm in Framingham, Mass., advises osers to spend more time evaluating the support staff that will be implementing the technology, rather than the technology itself.

"Mirroring technology is mature, but salespeople do not like to tell you about all of the challenges and cootingencies," Poresky says. QuickLink 41777

Fits and Starts

KeyCorp's remote-mirroring project timeline

2000

- **SEPTEMBER:** KeyCorp puts out a request for proposals for a data-mirroring system to replace its tape backup system. EMC, IBM and Hitachi respond.

2001

- **APRIL:** KeyCorp selects IBM's XRC data-mirroring technology.
- **DECEMBER:** Original project completion date passes as synchronization problems keep the remote-mirroring system off-line. A revised completion date is set for March.

2002

- **MARCH:** KeyCorp misses the revised project completion date.
- **APRIL:** System is ready for testing. The initial disaster recovery test succeeds, but the system continues to suspend as a result of software and hardware tuning problems. Discouraged, KeyCorp imposes a project "chill period" and solicits a new round of bids from vendors.
- **JUNE:** KeyCorp again selects IBM, which brings in a new, dedicated project manager who completes an audit and analysis of the system.
- **NOVEMBER:** Revised project completion date slips again.

2003

- **JANUARY:** Data mirroring system finally goes live.

NARROWING THE FIELD

See why KeyCorp chose IBM as its vendor

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XML Gets Organized

As XML content expands, good management tools are key. Native XML databases, SQL database add-ons and third-party integration tools all present advantages — and trade-offs. **BY ROBERT L. SCHEIER**

WHEN THE CLASSWELL Learning Group began building a database of online lesson plans and other information for teachers, it needed to store and access conteot ranging from word processing files to copy scanned from textbooks. Because it needed to store, access and query all those data types, the publisher chose an XML database product.

"XML was pretty much a no-brainer for us," says Brendan Collins, director of IT at Classwell, a division of publisher Houghtoo Mifflin Co. in Boston.

IT organizations are using XML for everything from integrating applications to content management and access control. Native XML databases can help with storing and managing the resulting flood of XML documents, but they're not the only option. Major databases now offer XML translator features that transform XML documents into fields within their relational structures. That transformation process can eliminate many of the benefits of using XML, however, so SQL database vendors say they're planning to add oative XML capabilities to their products.

In the meantime, third-party vendors offer tools that they claim offer more complete integration among XML, relational and even flat-file databases.

Deciding which XML data store is right for you depends on whether you have a stable schema, or design, for your XML data; the degree to which you need to store and audit transactions in their original form; and whether the application is critical enough to justify the expense of a separate, native XML database, say users and software vendors.

XML is a hierarchical data description language that uses tags, such as "customer," to define the data componeots within a document. In contrast, relational databases such as Oracle, Microsoft SQL Server or IBM's DB2 organize data in well-defined rows and columns within tables.

The fact that XML documeots carry not only the data but also the definitions of that data makes it easier for those documents to "describe themselves" to multiple applications during a transaction. Compared with SQL, XML is also much more capable of dealing with unstructured data and data that can be more dynamic in both its meaning and its structure, says Paul Hessinger, executive vice president of HealthRamp Inc. in New York. HealthRamp develops software that allows doctors to prescribe medications using handheld computers. "The permanent data we oeed to take care of we store in SQL Server. But as we move the data from a handheld device to a Web server, that's largely done via XML," he says.

Choosing an Approach

XML also makes it easier to change the type or format of data stored in a database, says Jake Freivald, director of marketing at iWay Software, a division of New York-based Information Builders Inc. that develops XML integration tools. In an XML database, he says, adding a business-address field to a database only requires creating an extra set of data description tags within the document. In a relational database, he says, that change would require a new set of tables for the business addresses and defining how those new tables relate to every existing table in the database.

However, once the data is in XML, it can be harder to access in new or flexible ways because the XML tags provide a hierarchical method of describing data. For example, under the "patient" tag, an XML document might have a subtag for "name," which in turn might have subtags for "first name," "last name," "middle initial" and "nickname." Any query that can't understand that hierarchical structure will have to search every word of every document, resulting in possible performance bottlenecks.

One way to store XML data is in a native XML database that stores, searches, accesses and retrieves XML documents in their complete and original form. This boosts performance be-

cause a native XML database can optimize queries about customers, for example, by searching only the data with the appropriate tags and subtags that identify customers, rather than all the text in a document. Storing XML documents in their entirety, rather than breaking them into individual database fields, also makes it easier to audit or reconstruct transactions because all the details are stored in their original order and sequence. Implementing well-understood and stable XML schemas, or database designs, can also be easier in a native XML database than in a relational database that must translate XML documents into columns and rows.

The native XML database Collins chose, Tamino from Darmstadt, Germany-based Software AG, had early reliability and data-corruption problems but has since improved dramatically, he says. Collins did, however, have to write his own software for loading data, as well as for version control of the XML documents.

Other Roadblocks

This lack of tools is only one strike against native XML databases. Analyst Carl Olofson at IDC in Framingham, Mass., predicts that the very small market for native XML databases — just $42 million last year — will grow to only about $77 million in 2007 because relational database vendors and other software players will build native XML capabilities into their products.

Until they develop native XML support, major database vendors offer translation layers that either "shred" the XML document into small enough components to store in the fields of a relational database, or "cram" the entire XML document into a single field, according to Ron Schmelzer, a senior

analyst at ZapThink LLC, a market research firm in Waltham, Mass.

For example, Cengent Therapeutics in San Diego uses Oracle's XML DB function to share protein structure data stored in Oracle with data stored in Cengent's own XML database, says Kal Ramnarayan, Cengent's vice president and chief scientific officer. In this process, XML documents are created from SQL data, a critical capability that allows existing data to be stored and queried from new XML databases.

But XML enablement wouldn't work for Jerry Lettow, an IT architect at Hewlett-Packard Co. who is building an XML-based intranet portal to share sensitive financial information with thousands of key managers. Lettow needs to be able to review transactions to prove, for example, exactly what information was provided to the portal by a financial application.

Using Oracle, Lettow says he would have had to "go in and query to find out what special unique identifier" had been assigned to store that information within Oracle's columns and rows. He also worries that Oracle will stick to its vendor-specific XML query language instead of using the World Wide Web Consortium's XQuery standard.

The Third Alternative

Lettow instead chose a third path: He used a third-party tool to link his relational and XML worlds. With Redwood City, Calif.-based Ipedo Inc.'s XML Information Hub, he says, it's easier to find such information because the XML documents are stored whole. Several vendors offer similar tools to translate and manage data from multiple sources into XML documents.

Eventually, Schmelzer says, all major database vendors will offer native XML support. But to be truly native, the database must be able to take any arbitrary XML document and insert it into the data store without any modification and then retrieve that document without shredding, jamming or otherwise modifying it, he says. "Can it handle arbitrary variables in the XML documents, like lots of repeated tags and lots of levels of hierarchy?" Schmelzer asks. Another key feature is support for still-emerging standards such as XQuery.

Collins also warns not to underestimate the work involved in implementing XML. While his use of XML will save him money in the long run, he says schema design can be "a lot of work, and the more content you have, the more work it is."

Building the schema right the first time can also be important, says Ipedo's vice president of marketing and co-founder, Tim Mathews. "If you're using an XML-enabled relational database, to change your schema you have to dump and reload all of your data," he says, an unacceptable option for production databases that must be constantly available.

Before choosing an XML data store, customers must dig beneath the covers to understand exactly how the XML documents are stored and how they can be queried, says Lettow. "Does it store it as you uploaded it, or does it break it down into separate little instances [of data]? Can I get out exactly what I put in, or do I have to create a lot of extra code or a lot of special processes to re-create the original XML?"

But the effort is worth it, he says. "After playing with an XML database for the last year and seeing how powerful it is, I'm surprised that more people aren't plugging into just when and how to use them." **41948**

Scheier is a Computerworld contributing writer. Contact him at rscheier@charter.net.

XML DATABASE OPTIONS

Here's how the XML database tool vendors stack up

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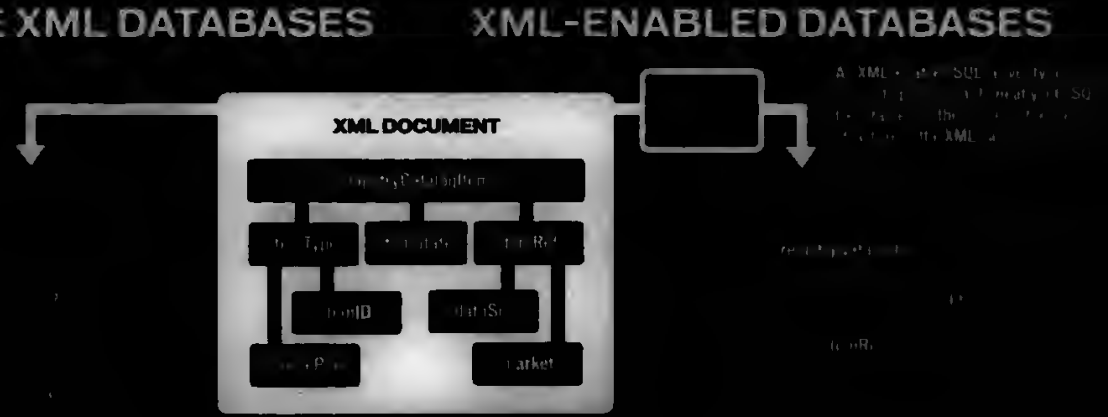

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Scheier is a Computerworld contributing writer. Contact him at rscheier@charter.net

Where XML Databases Make Sense

CONSIDER A NATIVE XML DATABASE WHEN

- XML data can be structured in a stable, well-accepted schema.
- XML documents must be kept in their original form for auditing or archiving.

CONSIDER AN XML-ENABLED RELATIONAL DATABASE WHEN

- It's hard to precisely define the XML schemas you will use.
- Investing in third-party integration tools is cost-prohibitive.
- The underlying relational data must be stored in its original format for long periods.

CONSIDER BOTH A NATIVE AND INTEGRATION TOOL WHEN

- The data being shared is critical enough to justify the expense.
- You must integrate multiple data sources such as SQL, flat file and text into a common XML schema.
- You can't wait for relational database vendors to provide such capabilities themselves.

XML DATABASE OPTIONS

Here's how the XML database tool vendors stack up

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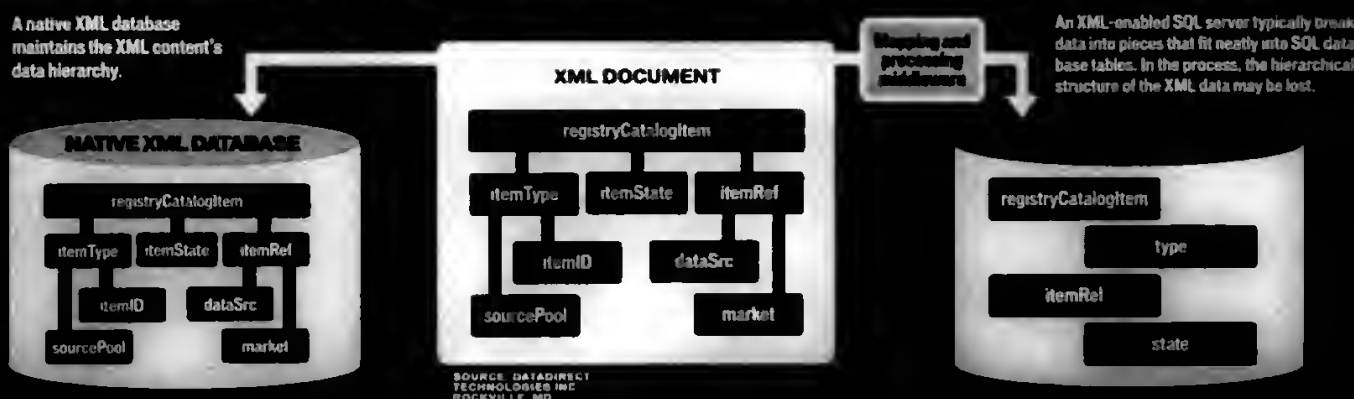
NATIVE XML DATABASES vs. XML-ENABLED DATABASES



SOURCE: DATADIRECT TECHNOLOGIES INC., ROCKVILLE, MD.

Software BUGS On the March

Technical, management and legal issues suggest they'll be around a while. BY PATRICK THIBODEAU

THE BLAME FOR SOFTWARE bugs belongs nearly everywhere. It belongs to vendors that rush products to market without adequately testing them, a sin also shared by corporate in-house development teams. It belongs to a legal system that has given software developers a free pass on bug-related damages. And it belongs to university computer science programs that stress development over testing.

Blame, however, doesn't belong with Sarfraz Khurshid, an MIT researcher who's at the forefront of developing automated testing processes for software. Testing software involves generating "inputs" — instructions for software to follow. But there are as many ways to test software as there are different snowflake patterns. For every possible way software can break, there must be a test that can detect that.

"There are an infinite number of inputs," says Khurshid, but once you know how to automatically generate them, "which ones do you generate?"

Khurshid has developed algorithms for generating inputs, and he expects the automated testing algorithms to improve over the next few years. But experts say improvements in automated testing technology alone won't necessarily lead to better software quality.

"Most software products have not been designed for quality," says Herb Krasner, who heads the Software Quality Institute at the University of Texas at Austin. "In the commercial world, quality software is not the primary motivation — the primary motivation is to get to market as fast as possible. It's the race to market that compromises quality in many cases."

Inadequate software testing is blamed for $60 billion in annual costs incurred by users and vendors, according to a study conducted last year by the Commerce Department's National Institute of Standards and Technology in Gaithersburg, Md. Viruses that exploit defects can cause billions of dollars in additional damages.

Standards Push

Today, there are no standards for measuring software quality, broadly defined as functionality, reliability, usability, efficiency, maintainability and portability. But there's a long-term effort under way to develop standards for comparing the quality of products, something that's impossible today.

This effort was prompted, in part, by one of the most famous software bugs of all: The one that caused the 1999 crash of the Mars Polar Lander on Mars. It was a watershed event for NASA and led to a decision by the space agency to expand its work with universities on quality issues. It even signed a lease allowing Carnegie Mellon University to establish a West Coast campus at Moffett Field, Calif.

FUTURE WATCH

NASA also helped to spearhead the creation of the Carnegie Mellon-based Sustainable Computing Consortium (SCC), an effort that includes companies such as FedEx Corp., Pfizer Inc., Microsoft Corp. and Oracle Corp.

Engineers know how to test the quality of many complex products, such as planes, drugs and bridges. But standards for measuring software quality and comparing similar software products don't exist.

What does it mean, for instance, when Microsoft says it wants to produce "trustworthy" products or Oracle sets "unbreakable" as its standard?

"How do you compare something that is trustworthy against something that is unbreakable?" asks William Guttman, director of the SCC at Pittsburgh-based Carnegie Mellon.

The SCC is seeking to support the creation of standards and specifications that will make it possible to measure a system's attributes, such as dependability and security. If these attributes can be measured in a software product, users will be able to make purchases based on quality, says Guttman, who compares the task ahead for his group to developing a municipal building code from scratch.

Blame the Lawyers

But some argue that future improvements in software quality are directly tied to legal and regulatory issues.

Cem Kaner, a computer science professor at the Florida Institute of Technology in Melbourne, who examined software's legal protections in the book *Bad Software* (John Wiley & Sons, 1998), compares the legal liability protections enjoyed by vendors to what automakers had before the arrival of "lemon laws" that guarantee consumers certain rights.

Vendors typically limit liability to the cost of the software. Damages suffered by a user as a result of downtime, such as lost sales, aren't covered.

The liability issue is becoming particularly pressing because of the damages wreaked by software viruses, which often exploit software defects. As these attacks become more sophisticated, they have the potential to expose customer financial records, disrupt businesses and "leave a wake of enormous destruction behind them," says Kaner.

Building software with as few bugs as possible is Dale Campbell's passion. As the senior director of IT at Warner Music Group, he sees a tremendous opportunity for lowering costs by improving software development.

Campbell is using tools, such as Monrovia, Calif.-based Parasoft Corp.'s error-detection software, to manage techniques to improve his software. He says his development processes are improving, as are the tools he's buying.

"Software defects really equate to rework, and rework equates to wasting money," says Campbell, a software engineer by training who manages application development at the New York-based entertainment company. "I don't think we would accept the same level of defects in the physical products we bought." ● 42061

MORE IN THIS ISSUE

For Tommy Peterson's take on software quality, read her column on page 35.

WHEN YOU NEED POWER PROTECTION
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ISO

Hidden Vulnerability Dogs VPN Project

A glitch in personal firewall software keeps a VPN off-line – and prompts a scramble for the right fix. By Vince Tuesday

I RECENTLY CHANGED positions and have been trying to understand the many projects already under way here. The most vital of these is a planned virtual private network (VPN) rollout. My company has many staffers who travel, as well as those who want to work from home.

SECURITY MANAGER'S JOURNAL

Today, these people use ISDN or dial-up lines. These have very high-price rates for calls from hotels and high fixed-cost line rental and call charges from staffers' homes. If the security team and I could let users connect using existing broadband Internet connections, the performance would be better and the costs lower.

Many users appear to be connecting company laptops directly to the Internet to get fast access, but their systems get infected with viruses or worms and then propagate the infections by connecting to internal company systems. Given that, a VPN should dramatically improve security as well as save the company money.

Unfortunately, the project has been in the works for 18 months and still hasn't delivered a workable system. I was flabbergasted, since I've always run projects on a three-month cycle.

It's now just three weeks until the go-live date, but there's one huge problem that must be resolved. The IT team has put together a software package for the laptops that includes a VPN dialer and security products. This package will sit on our standard software build and include antivirus software and a personal firewall. Although the machine will be connected to the Internet, the firewall will block all inbound and outbound connections other than the VPN link.

That sounds great, but the testing that my team did revealed that the firewall loads as a service when the operating system boots and shuts down when the user shuts down the machine. Since the networking software runs as a service on top of Windows, the machine is unprotected for at least 30 seconds during boot-up and shutdown.

Worst-Case Scenario

In the worst case in our testing, it took more than two minutes for the firewall to load and start doing its job. Why doesn't it just load the protection before starting the network? Or start the network without configuration, then load the protection and configure the network?

I won't mention the name of the software vendor, since I want it to have a chance to fix the problem. I'm pretty sure the problem affects some other vendors' products, so if you have a personal firewall on your machine, it might be a good idea to check that you don't have the same vulnerability.

Given how far down the road the IT team members were toward using this security product, they didn't want to give it up. Instead, they've been trying to add another layer of defense. Instead of using the USB Asymmetric Digital Subscriber Line (ADSL) modem delivered with the broadband service, they intend to buy everyone an ADSL router that includes a hardware firewall. The firewall is built into the firmware of the router and starts at the same time the router connects to the Internet, so the user's machine is always protected.

My task is to sign off that the configuration of the router firewall is acceptable. But I'm not going to do that. Yes, the configuration is fine; the security staffers have turned on network address translation (NAT) so that all internal machines are hidden, and they've enabled a firewall to block all inbound connections.

The security team has even password-protected the configuration so it will be difficult for each user to modify the settings. But just because it works on a technical level, that doesn't mean the IT security group should approve it.

The routers are much more expensive than fixing the software bug in the personal firewall or ripping out the flawed software and replacing it with a better package.

Remote Access Risks

Also, I know that some users will break into the routers and change the configurations when their children want to play Internet-based games. These typically require an inbound network connection for network play, so the configuration will be reset and bypassed — and we won't know it because we're not set up to centrally monitor remote firewall hardware or software configurations.

Most of our staffers have multiple machines at their homes, so they might not be using their work machines for gaming. But I'm certain that all of our staffers will connect their own machines into the same router we provide. The lure of that company-funded broadband connection will be irresistible.

Furthermore, the firewall and NAT on the router defend against only external threats from the Internet; any machines inside the home will have unfettered access to the corporate laptop.

Then there's the issue of remote travel. I know that our staffers who have laptops aren't going to take their router/firewall with them before they plug into the broadband connections at hotels.

To their credit, the IT team did manage to find a pocket hardware firewall that sits in line with the network cable and filters traffic. It's only about the size of a credit card and offers always-on network protection.

But during testing, the device somehow shorted out one of our network devices so badly that smoke was pouring out of it, giving a whole new meaning to the word *firewall*.

If we could just get the vendor to fix the start-up order so the firewall starts before the networking software, then we could save a lot of money, offer access in a wider range of environments and be more secure. The only argument against it seems to be 18 months of project inertia.

This should be an interesting test for me to understand my new employer's commitment to security. I'm meeting with the software firewall vendor next week. I'll let you know how we get on. Will we buy bundreds of expensive routers as a Band-Aid on one part of the issue, or will we fix the problem at its source? Stay tuned. **42098**

WHAT DO YOU THINK?

This week's journal is written by a real security manager, "Vince Tuesday," whose name and employer have been disguised for obvious reasons. Contact him at vince.tuesday@hushmail.com, or join the discussion in our forum. **QuickLink a1590**

To find a complete archive of our Security Manager's Journals, go online to **computerworld.com/secjournal**

SECURITY LOG

Security Bookshelf

***Secrets of Computer Espionage: Tactics and Countermeasures*, by Joel McNamara; John Wiley & Sons, 2003.**

This is a curious book, written by an ex-Minuteman staffer who takes credit for having developed one of the first known viruses (a distasteful endorsement). McNamara exposes the tactics hackers use to spy on people at their computers and discusses the ways users can protect themselves. He packs the text with juicy anecdotes and recent reports of spy activity. These stories, which range from companies stealing one another's customers to corrupt cops and tales of global intelligence agencies, are an enjoyable read. I also appreciated the inclusion of the pricing information for the products he discusses. Too many books simply refer you to the vendor.

Unfortunately, the book's biggest strength is also its one fault: McNamara spends too much time on the attack anecdotes and not enough providing in-depth details on how to keep your systems safe. This book is entertaining, but as a security professional, I found it more useful as a source of budget-justifying stories than as a source of practical, hands-on advice.

– Vince Tuesday

Bluefire Boosts Wireless Security

Bluefire Security Technologies Inc. in Baltimore announced a version of its Mobile Firewall Plus security software for carriers of wireless services. The software is designed to protect mobile devices such as PDAs and smart phones from a variety of security threats, including unauthorized access, denial-of-service attacks, information theft and spoofing, according to the company. The technology is aimed at carriers operating GPRS and CDMA wireless networks.

BRIEFS

LANDesk Upgrades Management Suite

LANDesk Software Inc. in South Jordan, Utah, last week announced its LANDesk Management Suite 8. The upgrade includes expanded inventory management and reporting tools, the company said. The database in the suite is now scalable to 200,000 nodes. Pricing ranges from $80 per node for 1,000 nodes to $89 per node for 10 nodes.

IBM's TotalStorage Gets Fibre Channel

IBM last week announced an upgrade to its high-end TotalStorage Enterprise Storage Server that offers Fibre Channel connections for its Peer to Peer Remote Copy disaster recovery software. TotalStorage formerly ran only on Escon connections, which are 30% slower and as much as 50% more expensive than the Fibre Channel connections, according to IBM. Most enhancements to TotalStorage will ship next month; all will be available by February.

Net Performance Monitor Ships

Network Physics Inc. in Mountain View, Calif., last week announced an appliance to link network and systems performance to the delivery of business services. The NP-2000 includes a new Business-Network Integration Engine to monitor all network traffic and identify performance, use and routing concerns.

Edocs Rolls Out Billing Suite

Natick, Mass.-based CRM software maker Edocs Inc. last week announced Version 4.0 of its eaSuite billing software. The new release comes with boosted business-to-business analytic, electronic invoicing and reporting capabilities, said edocs. EaSuite 4.0 is available now, and pricing starts at about $500,000.

TOMMY PETERSON

Send in the Exterminators

BUGS. The nickname for software defects makes them sound like a natural phenomenon, even kind of cute and relatively harmless. When I say "bug," I think ladybug. But this week's Future Watch (see page 32) suggests that programming errors are akin to cockroaches — as difficult to eradicate as those hard-shelled denizens of the dark and damp that, as urban legend would have it, could survive a nuclear blast.

Or maybe the correct analogy is to termites, as in something that insatiably chews through a company's profits and undermines the framework of the business.

The Sustainable Computing Consortium, a collaboration of major corporate IT users, academics and government agencies, has estimated that defective software cost businesses around the globe $175 billion in 2001.

And a 2002 study by the U.S. Commerce Department's National Institute of Standards and Technology indicated that software bugs cost U.S. companies about $60 billion per year.

That's a big bite out of the economy. Software is almost everywhere — in your toaster, in your car, in the power grid, in the airplane you'll take to meet your next client and, of course, in your back-office and, increasingly, front-office systems, no matter what business you're in.

It's time we stopped talking about software defects as though they're just an inevitable part of doing that business.

Last week in this space, *Computerworld*'s Robert L. Mitchell complained loudly about software vendors that assume no liability for the defects in their products and about the legal loopholes that allow them to do so. Ratcheting up legal pressure on companies to stop selling defective software is probably a good idea.

But a hailstorm of litigation isn't going to solve all or even most of the problems caused by flawed code.

One reason is that the wheels of justice grind exceedingly slowly and the problem is building to crisis proportions.

Another is the intricate interrelationship between the vendors of large software systems and their customers — a company has to be pushed pretty far to sue the vendor that has its tentacles around so much key information. And then there's the fact that a lot of the programming errors that cost companies money are made by in-house coders.

Almost everyone agrees that the rush to market is the reason so many software bugs crawl through development shops and creep out to end users.

Too often, cutting corners in quality is seen as a necessary trade-off to getting the product out the door quickly. And we know defects that are overlooked in the race to market become exponentially more expensive to find and fix the longer they go undetected.

But the Darwinian world of modern business isn't likely to slow down to give coders time to use current methods to construct their programs with lapidary precision.

"The mind-set has to be speed *and* quality," says Eric Schurr, a vice president at Rational Software Corp., part of IBM's Software Group. Schurr recalls a boss of his once saying that asking a business to choose between quality and speed was like asking a persoo to decide between breathing and having his heart pump.

Not surprisingly, since Rational makes software that automates program development and testing, Schurr believes that automation is a key to better quality.

But it's oot enough.

Asked when automatioo tools for testing complex programs would be available, he replies that they have "been around for 10 years."

Clearly, the spread of automated development and testing hasn't kept pace with the spread of software into every area of business and our lives.

The efforts to impose best practices in development shops and set standards should help. But it will be the market itself that finally provides the necessary pressure to squash the bugs.

"As software moves to the center of the business, when it isn't just a back-office function, companies find out that they must be more concerned about quality," says Schurr.

A vice president at a midsize Midwestern shipper, who didn't want to be identified, says his company recently lost $85,000 and several customers because of two bugs. One bug was in a vendor's routing and tracking software, and the other was in code created in-house to connect the routing system to the company's inventory system.

"The price tag oo bad software really hits home when you've got to talk to screaming customers, pay to make good and know that they're never coming back," he says. "The programmers who work for us are already doing things differently, and we'd have to think very hard about using the vendor again."

When enough companies feel the sting, a lot more software bugs will die on developers' desktops. 42262

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COMPUTERWORLD
SALARY SURVEY 2003

Salary Squeeze

Economic pressures have put a pinch on IT compensation again this year. While workloads are heavier and hours longer, our survey of nearly 15,000 IT professionals shows that most are seeing only modest pay raises and flat or declining bonuses. **By Julia King**

It's déjà vu all over again.

For the second year in a row, most of the IT professionals who responded to *Computerworld*'s annual salary survey received only modest pay raises, as well as flat or smaller bonus amounts compared with previous years. The average raise of this year's nearly 15,000 respondents was about 6.7%. On the bonus front, 71% of workers reported no change in compensation from a year ago. Meanwhile, the 15% of workers who reported decreases in bonuses said they fell by an average of 45%.

This is also the second consecutive year that some IT workers saw their paychecks shrink as a result of company-mandated salary reductions, which outpaced average pay raises this year by more than 2 to 1. While fewer workers reported pay cuts this year — 8.6% compared with 9.5% last year — this year's group was forced to forfeit the same amount as last year's — an average of 13% of their base salaries.

But most IT workers aren't as unhappy as you might expect, given this year's pay figures. Compared with the 4% average increase in pay for U.S. workers reported by the U.S. Department of Labor's Bureau of Labor Statistics, IT workers are holding their own in a tough economy.

In fact, only 22% of workers said they are dissatisfied with their overall compensation, even though many are working longer hours and shouldering heavier workloads because of permanent staff layoffs at their companies. Nearly 70% of IT professionals report regularly putting in more than 40 hours a week on the job, with one out of every four IT professionals working between 46 and 50 hours a week.

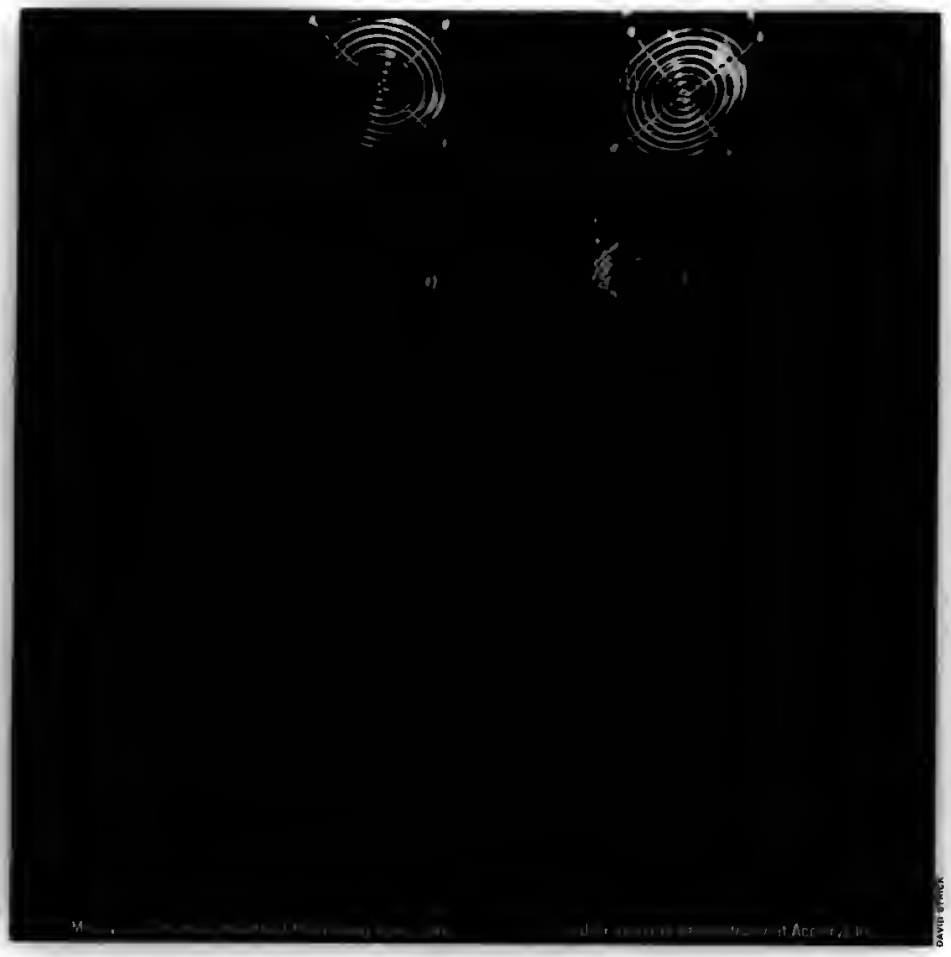
More than half of all IT workers — 54% — are satisfied with their overall compensation, and nearly all of the 40-plus IT workers, managers and CIOs interviewed for this story said they consider themselves lucky just to have a job in IT.

More Than Money

Consider the case of Diane Foote. A Unix systems administrator at Accelrys Inc., a pharmaceutical software and services company in San Diego, Foote is earning the same amount of money she was earning more than two years ago. "In those two years, I was laid off, rehired as a consultant, and then my contract ended. I found [this] job fairly quickly but took a cut

ONLINE EXCLUSIVE:

DANIEL BAXTER



DAVID STANCK

in pay to get it," she says.

Is she satisfied? "Money isn't the most important thing about a job to me," Foote says. "The benefits at my new place are good — three weeks of vacation to start and an on-site health club. So, I'm happy ... to have found a job so quickly in this economy."

Joyce Young, the CIO at CP Kelco US, a manufacturer of food ingredients, says economic pressures translate into lower salaries for most IT workers, particularly middle managers. "The market trend in Chicago right now seems to support lower salaries for IT, especially at the director level — around $120,000 to $150,000. People who used to be making the high end of this scale are accepting positions at the lower end," says Young, who works in the Chicago office of Wilmington, Del.-based CP Kelco. In the next 12 months, her company will hire two senior managers for IT projects focused on CRM and supply chain improvements. Their salaries will be determined by local market trends, Young says. Right now, she notes, "there are still many IT people out of work, and that seems to drive salaries down."

Lower-cost offshore outsourcing is another factor contributing to flat or decreasing salaries for IT workers, says Ron Glickman, CIO at San Francisco-based DFS Group Ltd., which operates 400 duty-free

Getting Greener

Director/vice president of networks
6.8%↑

E-commerce manager
4.6%↑

Communications specialist
4.1%↑

Figures show change in total compensation, 2002 to 2003

Total Compensation by Region

	NEW ENGLAND	MIDDLE ATLANTIC	SOUTH ATLANTIC	NORTH CENTRAL	SOUTH CENTRAL	MOUNTAIN	PACIFIC
Director of IT operations	$138,810	$144,021	$137,170	$[illegible]	$[illegible]	$[illegible]	$[illegible]
Help desk manager	$53,400	$68,091	$[illegible]	$[illegible]	$67,857	$52,200	$73,140
IT manager	$88,696	$81,000	$78,288	$[illegible]	$78,544	$74,181	$84,062
Application development manager	$98,578	$[illegible]	$90,117	$92,717	$84,808	$77,400	$100,884
Project manager	$108,784	$102,892	$97,[illegible]	$[illegible]	$[illegible]	$93,000	$100,085
Database administrator	$81,606	$84,057	$74,[illegible]	$78,[illegible]	$78,708	$77,884	$88,890
Help desk/tech support specialist	$48,000	$44,810	$[illegible]	$40,057	$47,004	$44,884	$52,[illegible]
Technology/business analyst	$71,706	$76,047	$[illegible]	$67,[illegible]	$67,884	$66,880	$70,881
Network administrator	$66,400	$65,708	$61,821	$60,051	$62,201	$[illegible]	$61,208
Network engineer	$78,911	$71,400	$72,722	$70,272	$71,108	$64,417	$72,881
Programmer/analyst	$74,971	$68,881	$[illegible]	$80,880	$80,[illegible]	$68,880	$72,707
Project leader	$83,747	$78,841	$[illegible]	$77,068	$82,400	$78,[illegible]	$[illegible]
Software engineer	$87,[illegible]	$78,[illegible]	$78,[illegible]	$74,271	$[illegible]	$77,[illegible]	$[illegible]
Systems administrator	$72,081	$68,080	$[illegible]	$[illegible]	$80,180	$[illegible]	$[illegible]
Systems architect	$102,612	$[illegible]	$[illegible]	$87,[illegible]	$[illegible]	$87,[illegible]	$[illegible]
Senior systems analyst	$[illegible]	$[illegible]	$[illegible]	$78,[illegible]	$78,[illegible]	$76,[illegible]	$[illegible]
Software developer	$[illegible]	$78,[illegible]	$74,[illegible]	$67,[illegible]	$78,[illegible]	$74,[illegible]	$[illegible]

REGIONS ARE AS FOLLOWS:
New England: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island; **Middle Atlantic:** New York, New Jersey, Pennsylvania; **South Atlantic:** Delaware, District of Columbia, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Puerto Rico, U.S. Virgin Islands; **North Central:** Wisconsin, Michigan, Illinois, Indiana, Ohio, North Dakota, South Dakota, Minnesota, Nebraska, Iowa, Kansas, Missouri; **South Central:** Kentucky, Tennessee, Mississippi, Alabama, Oklahoma, Arkansas, Louisiana, Texas; **Mountain:** Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico; **Pacific:** Alaska, Washington, Oregon, California, Hawaii, Guam

GOLD TEXT - Indicates that the total base for this particular region was fewer than 30 responses but more than 15. These figures should be used for comparison only.

Boost Your Chances of Getting a Raise

ADVICE

Before you march up to your manager to demand a raise, keep in mind that money is just one piece of the compensation pie, experts advise. First, calculate the value of company-provided training, medical and dental benefits, retirement savings plans and spot rewards such as an afternoon off or a $200 gift certificate here or there. It very well could turn out that your overall compensation is indeed in line with that of your peers at other companies, or at least those in your geographical area.

"Salaries vary so much by region and industry that you really need to compare apples to apples," says Laurie Levenson, president of DirectAccess Technology Staffing Inc. in Carlsbad, Calif.

That said, Levenson and others note that there are certain IT skills for which companies are willing to pay a premium right now. On the technical side, .Net experience is perhaps the hottest skill, with network security experience running a close second. On the management side, says Gartner Inc. analyst Linda Pittenger, "we're finding [that] strategic planning or any role that enhances resource utilization, such as IT alignment skills, are the ones getting paid more. These include IT architects and IT sourcing officers and people involved in project and portfolio management and process improvement roles."

IT professionals with data mining and business intelligence experience could also get raises, says Katherine Spencer Lee, executive director of RHI Consulting in Menlo Park, Calif. Specifically, these include professionals proficient with software tools from SAS Institute Inc., Business Objects SA and Cognos Inc.

Regardless of your specific skills or experience, Levenson offers this advice: "Work with management on agreed-upon measures and get a commitment that if certain goals are met, a raise is received. That's a much more effective way to get a raise than to take a salary survey in there and demand it."

– Julia King

retail shops at airports and other sites worldwide.

"In our global economy, IT work flows to the lowest-cost and highest-quality provider. We're doing more this year than ever before on half the operating budget," Glickman says, thanks largely to his company's outsourcing deal with Teaneck, N.J.-based Cognizant Technology Solutions US Corp.

"I can't afford to hire master [IT] skills, so I buy master skills from an offshore partner — and only for the hours that I need them," Glickman explains. On new IT projects, DFS, which has reduced its IT workforce significantly, typically outsources 70% of the work to Cognizant contractors offshore, retaining 30% of the work in-house. As projects mature, the mix shifts to 90% offshore, 10% in-house, he says.

DFS isn't alone in shedding permanent employees — and the fixed labor costs associated with them. Allmerica Financial Corp., Corning Inc. and MetLife Inc. have laid off IT workers over the past 12 months. However, they did so at the risk of being perceived as less-attractive employers to the expert IT workers they'll need to hire once the economy bounces back.

Once a company has laid off employees, "the psychological contract is broken," says Gartner Inc. analyst Diane Berry. "Many C-level executives don't get that. They underestimate the impact of what layoffs mean down the road."

CIO Phil Go has no illusions about the impact of layoffs. His employer, Barton Malow Co., a construction management firm in Southfield, Mich., has laid off IT workers in the past 12 months. Now, Go says, he needs to demonstrate how much he values the remaining IT workers. If he doesn't, "when times are good, [I] would expect a mass exodus because they would feel taken advantage of," he says. "So we still give good — but not great — salary adjustments of between 3% and 6%. It's not great, but it's not zero."

In an unusual twist, Chetan Shah, executive vice president of technology at Synygy Inc. in Conshohocken, Pa., hasn't laid off IT workers. Instead, Shah has reduced the salaries of certain average and below-average IT workers to fund pay raises and bonuses for valued software engineers and other IT employees he wants to retain at the software and services company. "Reducing salaries is the last thing you want to do, but we have done it," Shah says.

Even bigger morale-busters than pay cuts are the daily fear of being laid off and the lack of job security in IT overall, sources say. One indicator is the accumulation of unused vacation time at many companies, says Linda Pittenger, who specializes in IT human resources at Gartner. "The underlying theme in people's minds is, 'I need to be here and be visible. If there's another cut, I need to be here to survive it,' " she says. "A lot of people have given up what we've worked so hard for on work/life balance."

As for job security, James Tow, who earns a salary of $67,000 as a database developer in Idaho Falls, Idaho, put it this way: "After being laid off three times, I have such a profound sense of paranoia, I don't think I'd feel secure if the owner came here and gave me the keys to the building." Asked about the likelihood of a salary increase, Tow recalls the go-go days of the late 1990s. "We had the mind-set that we could walk out the door and on the same day walk in the door of a company down the street and get a raise and a signing bonus.

"Frankly, I think management is a little resentful of IT because they were almost beholden to us then," he says. "So, I don't foresee IT salaries going up more than a basic cost-of-living increase. We're back in the same boat as everyone else." ● 41785

The Biggest Raises

Defense/aerospace 5%
BASE 449

Entertainment/advertising 5%
BASE 445

Nonprofit organizations 4.1%
BASE 297

ILLUSTRATION BY CASEY BASTIAN

Workaday World

28% reported working an average of 41 to 45 hours per week

25% reported working 46 to 50 hours per week

16% reported working more than 51 hours per week

Wish List

The top five perks that respondents wished their companies offered:

Additional time off	43%
Telecommuting	37%
Comp time	30%
Flexible scheduling	20%
Company car	19%

What's Tempting

Respondents said these factors would sway them to accept a job with lower compensation:

More job satisfaction	43%
Better work/life balance	38%
Location	37%

33% said nothing would induce them to take a job with lower compensation.

BASE: 278 RESPONDENTS

Bonus Question

The top four types of bonuses that respondents said they had received in the past year:

Performance	33%
Year-end	22%
Profit-sharing	18%
Team	7%

NOTE: Percentages are based on IT workers employed full time or part time in an IT department. For salary information on contract workers and consultants who responded to *Computerworld*'s survey, visit our Web site: **QuickLink a3750** ● **www.computerworld.com**

Boost Your Chances of Getting a Raise

ADVICE

Before you march up to your manager to demand a raise, keep in mind that money is just one piece of the compensation pie, experts advise. First, calculate the value of company-provided training, medical and dental benefits, retirement savings plans and spot rewards such as an afternoon off or a $200 gift certificate here or there. It very well could turn out that your overall compensation is indeed in line with that of your peers at other companies, or at least those in your geographical area.

"Salaries vary so much by region and industry that you really need to compare apples to apples," says Laurie Levenson, president of DirectAccess Technology Staffing Inc. in Carlsbad, Calif.

That said, Levenson and others note that there are certain IT skills for which companies are willing to pay a premium right now. On the technical side, .Net experience is perhaps the hottest skill, with network security experience running a close second. On the management side, says Gartner Inc. analyst Linda Pittenger, "we're finding [that] strategic planning or any role that enhances resource utilization, such as IT alignment skills, are the ones getting paid more. These include IT architects and IT sourcing officers and people involved in project and portfolio management and process improvement roles."

IT professionals with data mining and business intelligence experience could also get raises, says Katherine Spencer Lee, executive director of RHI Consulting in Menlo Park, Calif. Specifically, these include professionals proficient with software tools from SAS Institute Inc., Business Objects SA and Cognos Inc.

Regardless of your specific skills or experience, Levenson offers this advice: "Work with management on agreed-upon measures and get a commitment that if certain goals are met, a raise is received. That's a much more effective way to get a raise than to take a salary survey in there and demand it."

– *Julia King*

retail shops at airports and other sites worldwide.

"In our global economy, IT work flows to the lowest-cost and highest-quality provider. We're doing more this year than ever before on half the operating budget," Glickman says, thanks largely to his company's outsourcing deal with Teaneck, N.J.-based Cognizant Technology Solutions US Corp.

"I can't afford to hire master [IT] skills, so I buy master skills from an offshore partner — and only for the hours that I need them," Glickman explains. On new IT projects, DFS, which has reduced its IT workforce significantly, typically outsources 70% of the work to Cognizant contractors offshore, retaining 30% of the work in-house. As projects mature, the mix shifts to 90% offshore, 10% in-house, he says.

DFS isn't alone in shedding permanent employees — and the fixed labor costs associated with them. Allmerica Financial Corp., Corning Inc. and MetLife Inc. have laid off IT workers over the past 12 months. However, they did so at the risk of being perceived as less-attractive employers to the expert IT workers they'll need to hire once the economy bounces back.

Once a company has laid off employees, "the psychological contract is broken," says Gartner Inc. analyst Diane Berry. "Many C-level executives don't get that. They underestimate the impact of what layoffs mean down the road."

CIO Phil Go has no illusions about the impact of layoffs. His employer, Barton Malow Co., a construction management firm in Southfield, Mich., has laid off IT workers in the past 12 months. Now, Go says, he needs to demonstrate how much he values the remaining IT workers. If he doesn't, "when times are good, [I] would expect a mass exodus because they would feel taken advantage of," he says. "So we still give good — but not great — salary adjustments of between 3% and 6%. It's not great, but it's not zero."

In an unusual twist, Chetan Shah, executive vice president of technology at Synygy Inc. in Conshohocken, Pa., hasn't laid off IT workers. Instead, Shah has reduced the salaries of certain average and below-average IT workers to fund pay raises and bonuses for valued software engineers and other IT employees he wants to retain at the software and services company. "Reducing salaries is the last thing you want to do, but we have done it," Shah says.

Even bigger morale-busters than pay cuts are the daily fear of being laid off and the lack of job security in IT overall, sources say. One indicator is the accumulation of unused vacation time at many companies, says Linda Pittenger, who specializes in IT human resources at Gartner. "The underlying theme in people's minds is, 'I need to be here and be visible. If there's another cut, I need to be here to survive it.'" she says. "A lot of people have given up what we've worked so hard for on work/life balance."

As for job security, James Tow, who earns a salary of $67,000 as a database developer in Idaho Falls, Idaho, put it this way: "After being laid off three times, I have such a profound sense of paranoia, I don't think I'd feel secure if the owner came here and gave me the keys to the building." Asked about the likelihood of a salary increase, Tow recalls the go-go days of the late 1990s. "We had the mind-set that we could walk out the door and go the same day walk in the door of a company down the street and get a raise and a signing bonus.

"Frankly, I think management is a little resentful of IT because they were almost beholden to us then," he says. "So, I don't foresee IT salaries going up more than a basic cost-of-living increase. We're back in the same boat as everyone else." **41785**

The Biggest Raises

Defense/aerospace 5%
BASE 449

- **Entertainment/advertising** 5%
BASE 445
- **Nonprofit organizations** 4.1%
BASE 217

Workaday World

28% reported working an average of 41 to 45 hours per week

25% reported working 46 to 50 hours per week

16% reported working more than 51 hours per week

Wish List

The top five perks that respondents wished their companies offered:

Additional time off	43%
Telecommuting	37%
Comp time	30%
Flexible scheduling	20%
Company car	19%

What's Tempting

Respondents said these factors would sway them to accept a job with lower compensation:

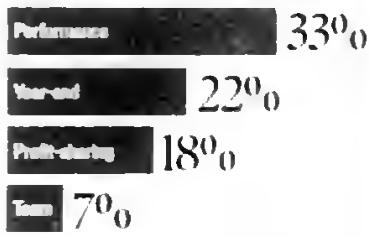
More job satisfaction	43%
Better work/life balance	38%
Location	37%

33% said nothing would induce them to take a job with lower compensation.

BASE 378 RESPONDENTS

Bonus Question

The top four types of bonuses that respondents said they had received in the past year:



NOTE: Percentages are based on IT workers employed full time or part time in an IT department. For salary information on contract workers and consultants who responded to *Computerworld*'s survey, visit our Web site **QuickLink a3750** ■ **www.computerworld.com**

SENIOR MANAGEMENT POSITIONS					MIDDLE MANAGEMENT POSITIONS				
CIO, vice president of IT	Chief technology officer	Director of systems development	Director of IT operations	Internet technology strategist	Computer operations manager	Help desk/ tech support manager	Information security manager	IT manager	Network manager
1.6%	0.3%	-0.4%	2.3%	0.5%	2.2%	1.2%	2.9%	2.1%	3.7%
Average salary **$126,430**	Average salary **$126,164**	Average salary **$120,864**	Average salary **$93,564**	Average salary **$98,811**	Average salary **$74,899**	Average salary **$64,551**	Average salary **$77,959**	Average salary **$74,884**	Average salary **$65,490**
Bonus **$25,539**	Bonus **$21,552**	Bonus **$14,850**	Bonus **$10,953**	Bonus **$13,881**	Bonus **$7,073**	Bonus **$3,740**	Bonus **$7,477**	Bonus **$5,056**	Bonus **$3,492**
Total **$153,968**	Total **$149,716**	Total **$135,614**	Total **$104,517**	Total **$112,672**	Total **$81,972**	Total **$68,291**	Total **$65,436**	Total **$79,940**	Total **$68,982**
2002 Total **$151,593**	2002 Total **$149,342**	2002 Total **$136,309**	2002 Total **$102,134**	2002 Total **$112,079**	2002 Total **$80,187**	2002 Total **$67,507**	2002 Total **$83,024**	2002 Total **$78,261**	2002 Total **$68,548**

A Sampling of Average Total Compensation by Industry

Banking **$136,225**	Computer services/consulting **$132,566**	Computer services/consulting **$141,659**	Health care **$86,110**	Computer services/consulting **$116,896**	Computer services/consulting* $88,456	Computer services/consulting **$72,265**	Banking* **$95,182**	Banking **$74,923**	Education $57,221
Business services/consulting [illegible]	Entertainment/ advertising* **$150,014**	Education* **$103,275**	Government **$98,656**	Government* $82,300	Health care* **$73,703**	Education [illegible]	Government $68,756	Business services/consulting **$77,172**	Government $66,651
Computer services/consulting **$162,106**	Manufacturing (computer)* **$191,033**	Manufacturing (noncomputer)* **$112,378**	Finance **$121,436**	Manufacturing (computer)* $123,928	Manufacturing (noncomputer) [illegible]	Manufacturing (noncomputer) [illegible]	Manufacturing (noncomputer)* **$99,418**	Computer services/consulting **$87,247**	Manufacturing (noncomputer) $74,116
Education **$107,390**		Telecommunications* **$143,425**	Computer services/consulting **$122,338**					Education **$62,717**	
Entertainment/ advertising [illegible]			Education **$81,485**					Energy/utilities **$94,149**	
Government **$95,780**			Manufacturing (noncomputer) **$110,680**					Finance/accounting **$101,279**	
Finance/accounting **$168,473**			Telecommunications* **$122,372**					Manufacturing (noncomputer) **$83,066**	

A Sampling of Average Total Compensation by Company Revenue

Less than $100M **$125,143**	Less than $100M **$130,819**	Less than $100M **$115,028**	Less than $100M **$85,801**	Less than $100M [illegible]	Less than $100M **$73,275**	Less than $100M **$55,473**	Less than $100M **$77,377**	Less than $100M **$68,112**	Less than $100M **$63,001**
$100M to $999.9M **$172,148**	$100M to $999.9M **$171,885**	$100M to $999.9M **$136,744**	$100M to $999.9M **$115,515**	$100M to $999.9M **$114,922**	$100M to $999.9M **$81,266**	$100M to $999.9M **$71,903**	$100M to $999.9M $84,815	$100M to $999.9M **$83,987**	$100M to $999.9M **$76,609**
$1B to $10B **$175,541**	$1B to $10B* $201,731	$1B to $10B **$142,750**	$1B to $10B **$130,499**	$1B to $10B **$105,557**	$1B to $10B [illegible]	$1B to $10B **$77,732**	$1B to $10B **$89,350**	$1B to $10B **$95,395**	**NA**
More than $10B **$206,019**	**NA**	More than $10B [illegible]	More than $10B **$150,691**	More than $10B **$131,872**	More than $10B* $101,807	More than $10B [illegible]	More than $10B [illegible]	More than $10B **$99,482**	More than $10B* **$81,995**

Indicates that the total base for this job title in this particular industry or company size was fewer than 30 responses but more than 15 responses. These figures should be used for comparison only because they don't constitute a statistically significant sampling.

* Indicates that the total base for this job title in this particular industry or company size was fewer than 16 responses but more than nine responses. These figures should be used for comparison only.

- Indicates percentage change 2002-2003

CHARTS CONTINUE ON PAGE 42

A Sampling of Other Job Titles

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.4%	-1.9%	6.8%	0.2%	0.6%	0.7%	4.6%	0.1%	4.1%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BASE: 16	BASE: 64	BASE: 38	BASE: 89	BASE: 107	BASE: 37	BASE: 57	BASE: 66	BASE: 77
2002 Total **$117,769**	2002 Total **$149,615**	2002 Total **$126,858**	2002 Total **$74,203**	2002 Total **$89,960**	2002 Total **$97,802**	2002 Total **$92,210**	2002 Total **$83,397**	2002 Total **$56,686**

SENIOR MANAGEMENT POSITIONS					MIDDLE MANAGEMENT POSITIONS				
1.6%	0.3%	-0.4%	2.3%	0.5%	2.2%	1.2%	2.9%	2.1%	3.7%
Average salary $128,430	Average salary $128,184	Average salary $120,864	Average salary $93,564	Average salary $98,811	Average salary $74,899	Average salary $64,551	Average salary $77,959	Average salary $74,864	Average salary $65,490
Bonus $25,539	Bonus $21,552	Bonus $14,950	Bonus $10,953	Bonus $13,861	Bonus $7,073	Bonus $3,740	Bonus $7,477	Bonus $5,056	Bonus $3,492
Total $153,969	Total $149,716	Total $135,814	Total $104,517	Total $112,672	Total $81,972	Total $68,291	Total $85,436	Total $79,940	Total $68,982
2002 Total $151,593	2002 Total $149,342	2002 Total $136,309	2002 Total $102,134	2002 Total $112,079	2002 Total $80,197	2002 Total $67,507	2002 Total $83,034	2002 Total $78,261	2002 Total $66,548

A Sampling of Average Total Compensation by Industry

Banking $136,225	Computer services/consulting $132,586	Computer services/consulting $141,659	Health care $96,110	Computer services/consulting $116,896	Computer services/consulting* $88,456	Computer services/consulting $72,265	Banking* $95,182	Banking $74,923	Education $57,221
Business services/consulting $165,200	Entertainment/ advertising* $150,014	Education* $103,275	Government $96,858	Government* $82,300	Health care* $73,703	Education $50,615	Government $68,756	Business services/consulting $77,172	Government $66,651
Computer services/consulting $162,106	Manufacturing (computer)* $191,033	Manufacturing (noncomputer)* $112,378	Finance $121,438	Manufacturing (computer)* $123,926	Manufacturing (noncomputer) $83,713	Manufacturing (noncomputer) $65,812	Manufacturing (noncomputer)* $99,418	Computer services/consulting $67,247	Manufacturing (noncomputer) $74,116
Education $107,390		Telecommunications* $143,425	Computer services/consulting $122,338					Education $62,717	
Entertainment/ advertising $165,449			Education $81,485					Energy/utilities $94,149	
Government $95,780			Manufacturing (noncomputer) $110,680					Finance/accounting $101,279	
Finance/accounting $166,473			Telecommunications* $122,372					Manufacturing (noncomputer) $83,066	

A Sampling of Average Total Compensation by Company Revenue

Less than $100M $125,143	Less than $100M $130,819	Less than $100M $115,028	Less than $100M $85,801	Less than $100M $95,713	Less than $100M $73,275	Less than $100M $55,473	Less than $100M $77,377	Less than $100M $68,112	Less than $100M $63,001
$100M to $999.9M $172,148	$100M to $999.9M $171,885	$100M to $999.9M $136,744	$100M to $999.9M $115,515	$100M to $999.9M $114,922	$100M to $999.9M $81,266	$100M to $999.9M $71,903	$100M to $999.9M $84,615	$100M to $999.9M $83,967	$100M to $999.9M $76,609
$1B to $10B $175,541	$1B to $10B* $201,731	$1B to $10B $142,750	$1B to $10B $130,499	$1B to $10B $105,557	$1B to $10B $86,398	$1B to $10B $77,732	$1B to $10B $99,350	$1B to $10B $95,395	NA
More than $10B $206,019	NA	More than $10B $160,661	More than $10B $150,691	More than $10B $131,872	More than $10B* $101,807	More than $10B $91,730	More than $10B $99,424	More than $10B $99,482	More than $10B* $81,995

GOLD TEXT - Indicates that the total base for this job title in this particular industry or company size was fewer than 30 responses but more than 15 responses. These figures should be used for comparison only, because they don't constitute a statistically significant sampling.
* Indicates that the total base for this job title in this particular industry or company size was fewer than 16 responses but more than nine responses. These figures should be used for comparison only
↑ ↓ Indicates percentage change, 2002-2003

CHARTS CONTINUE ON PAGE 42

A Sampling of Other Job Titles

Chief security officer	Director/VP of e-commerce/e-business	Director/VP of networks	Communications manager	Database manager	Data warehousing manager	E-commerce manager	Internet/intranet manager	Communications specialist
3.4%	-1.9%	6.8%	0.2%	0.6%	0.7%	4.6%	0.1%	4.1%
2002 Total $117,788	2002 Total $148,615	2002 Total $126,850	2002 Total $74,203	2002 Total $99,900	2002 Total $87,802	2002 Total $92,210	2002 Total $83,297	2002 Total $70,000

MIDDLE MANAGEMENT POSITIONS			STAFF AND ENTRY-LEVEL POSITIONS						
Product manager	Application development manager	Project manager	Database administrator	Help desk/tech support specialist	Information security specialist	Technology business analyst	Network administrator	Network engineer	Programmer/analyst
2.1%	1.8%	0.1%	2.2%	0.3%	2.3%	1.2%	1.1%	1.6%	2%
Average salary **$88,740**	Average salary **$85,701**	Average salary **$83,580**	Average salary **$72,236**	Average salary **$43,734**	Average salary **$70,780**	Average salary **$64,318**	Average salary **$51,265**	Average salary **$66,487**	Average salary **$61,564**
Bonus **$10,657**	Bonus **$7,620**	Bonus **$6,242**	Bonus **$5,276**	Bonus **$2,077**	Bonus **$4,231**	Bonus **$3,552**	Bonus **$3,129**	Bonus **$4,083**	Bonus **$3,455**
Total **$99,397**	Total **$93,321**	Total **$91,622**	Total **$77,514**	Total **$45,611**	Total **$75,011**	Total **$67,870**	Total **$54,394**	Total **$70,570**	Total **$65,019**
2002 Total **$97,384**	2002 Total **$91,652**	2002 Total **$91,729**	2002 Total **$75,839**	2002 Total **$45,689**	2002 Total **$73,306**	2002 Total **$67,068**	2002 Total **$53,778**	2002 Total **$69,476**	2002 Total **$63,762**

A Sampling of Average Total Compensation by Industry

Computer services/consulting **$103,992**	Computer services/consulting **$94,991**	Computer services/consulting **$92,639**	Computer services/consulting **$77,878**	Business services/consulting [illegible]	Computer services/consulting **$78,141**	Banking **$68,400**	Computer services/consulting **$58,061**	Banking [illegible]	Banking **$73,326**
Manufacturing (computer) [illegible]	Education [illegible]	Manufacturing (computer) [illegible]	Manufacturing (noncomputer) **$70,442**	Computer services/consulting **$51,268**	Defense/aerospace* **$76,465**	Computer services/consulting **$70,637**	Education **$46,520**	Computer services/consulting **$71,334**	Computer services/consulting **$68,442**
Telecommunications* **$77,768**	Government **$75,762**	Telecommunications* **$78,261**	Government **$65,813**	Computer dealer/ reseller [illegible]	Government [illegible]	Government **$57,099**	Government **$57,090**	Education **$55,884**	Government **$55,863**
	Legal/insurance/ real estate [illegible]		Finance/accounting [illegible]	Education **$36,927**	Finance/accounting* **$79,366**	Finance/accounting **$65,769**	Legal/insurance/ real estate **$51,427**	Government **$66,049**	Finance/accounting **$70,277**
	Health care [illegible]		Legal/insurance/ real estate [illegible]	Government **$44,711**	Manufacturing (noncomputer)* **$82,760**	Health care **$65,311**	Health care **$56,057**	Finance/accounting [illegible]	Legal/insurance/ real estate **$66,585**
	Manufacturing (noncomputer) **$92,254**		Health care **$64,041**	Finance/accounting [illegible]		Manufacturing (noncomputer) **$67,411**	Manufacturing (noncomputer) **$52,673**	Health care [illegible]	Health care **$65,352**
	Manufacturing (computer) **$100,793**		Telecommunications **$60,758**	Legal/insurance/ real estate [illegible]		Telecommunications [illegible]	Manufacturing (computer) **$65,792**	Manufacturing (noncomputer) [illegible]	Manufacturing (noncomputer) **$61,434**
						Retail/trade [illegible]		Telecommunications **$68,345**	

A Sampling of Average Total Compensation by Company Size Revenue

Less than $100M **$86,934**	Less than $100M **$81,140**	Less than $100M **$79,447**	Less than $100M **$66,117**	Less than $100M **$40,398**	Less than $100M **$66,117**	Less than $100M **$60,242**	Less than $100M **$52,197**	Less than $100M **$65,295**	Less than $100M **$59,248**
$100M to $999.9M **$98,773**	$100M to $999.9M **$92,969**	$100M to $999.9M **$88,276**	$100M to $999.9M **$62,089**	$100M to $999.9M **$45,655**	$100M to $999.9M **$80,332**	$100M to $999.9M **$65,825**	$100M to $999.9M **$55,743**	$100M to $999.9M **$69,432**	$100M to $999.9M **$64,702**
$1B to $10B **$109,497**	$1B to $10B **$100,495**	$1B to $10B **$95,769**	$1B to $10B **$83,233**	$1B to $10B **$52,431**	$1B to $10B **$73,621**	$1B to $10B **$75,036**	$1B to $10B **$61,244**	$1B to $10B **$75,409**	$1B to $10B **$69,590**
More than $10B [illegible]	More than $10B **$107,602**	More than $10B **$103,686**	More than $10B **$89,951**	More than $10B **$55,935**	More than $10B **$80,948**	More than $10B **$74,014**	More than $10B [illegible]	More than $10B **$80,894**	More than $10B **$73,120**

Indicates that the total base for this job title in this particular industry or company size was fewer than 30 responses but more than 15. These figures should be used for comparison only because they don't constitute a statistically significant sampling.

* Indicates that the total base for this job title in this particular industry or company size was fewer than 16 responses, but more than 9 responses. These figures should be used for comparison only.

Indicates percentage change: 2002-2003

CHARTS CONTINUE ON PAGE 44

A Sampling of Other Job Titles

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Network architect	Quality assurance specialist	Technical trainer	Webmaster
4%	2.3%	0.2%	1.9%	-1.1%	1.6%	1.7%	-5.5%	1.2%	-0.2%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BASE: 50	BASE: 78	BASE: 61	BASE: 74	BASE: 45	BASE: 45	BASE: 58	BASE: 115	BASE: 100	BASE: 89
2002 Total **$36,968**	2002 Total **$66,411**	2002 Total **$95,688**	2002 Total **$73,672**	2002 Total **$70,925**	2002 Total **$75,905**	2002 Total **$91,953**	2002 Total **$69,949**	2002 Total **$55,165**	2002 Total **$52,441**

MIDDLE MANAGEMENT POSITIONS			STAFF AND ENTRY-LEVEL POSITIONS						
2.1%	1.8%	0.1%	2.2%	0.3%	2.3%	1.2%	1.1%	1.6%	2%
Average salary $86,740	Average salary $85,701	Average salary $83,580	Average salary $72,236	Average salary $43,734	Average salary $70,780	Average salary $64,318	Average salary $51,265	Average salary $66,487	Average salary $61,564
Bonus $10,657	Bonus $7,620	Bonus $8,242	Bonus $5,278	Bonus $2,077	Bonus $4,231	Bonus $3,552	Bonus $3,129	Bonus $4,083	Bonus $3,456
Total $99,397	Total $93,321	Total $91,822	Total $77,514	Total $45,811	Total $75,011	Total $67,870	Total $54,394	Total $70,570	Total $65,019
2002 Total $97,384	2002 Total $91,652	2002 Total $91,729	2002 Total $75,839	2002 Total $45,669	2002 Total $73,306	2002 Total $67,068	2002 Total $53,778	2002 Total $69,476	2002 Total $63,782

A Sampling of Average Total Compensation by Industry

Computer services/consulting $103,992	Computer services/consulting $94,991	Computer services/consulting $92,639	Computer services/consulting $77,876	Business services/consulting $43,903	Computer services/consulting $78,141	Banking $68,400	Computer services/consulting $58,081	Banking $80,011	Banking $73,326
Manufacturing (computer) $106,029	Education $71,829	Manufacturing (computer) $107,974	Manufacturing (noncomputer) $70,442	Computer services/consulting $51,268	Defense/aerospace* $76,465	Computer services/consulting $70,837	Education $48,520	Computer services/consulting $71,334	Computer services/consulting $68,442
Telecommunications* $77,768	Government $75,762	Telecommunications* $78,261	Government $65,813	Computer dealer/ reseller $50,814	Government $66,451	Government $57,099	Government $57,090	Education $55,884	Government $55,863
	Legal/insurance/ real estate $98,037		Finance/accounting $99,002	Education $36,927	Finance/accounting* $79,388	Finance/accounting $65,769	Legal/insurance/ real estate $51,427	Government $66,049	Finance/accounting $70,277
	Health care $81,630		Legal/insurance/ real estate $84,821	Government $44,711	Manufacturing (noncomputer)* $82,760	Health care $55,311	Health care $58,057	Finance/accounting $77,869	Legal/insurance/ real estate $66,585
	Manufacturing (noncomputer) $92,254		Health care $84,041	Finance/accounting $54,019		Manufacturing (noncomputer) $67,411	Manufacturing (noncomputer) $52,673	Health care $66,194	Health care $65,352
	Manufacturing (computer) $100,793		Telecommunications $80,756	Legal/insurance/ real estate $46,908		Telecommunications $79,067	Manufacturing (computer) $65,792	Manufacturing (noncomputer) $67,920	Manufacturing (noncomputer) $61,434
						Retail/trade $66,289		Telecommunications $68,345	

A Sampling of Average Total Compensation by Company Size Revenue

Less than $100M $88,934	Less than $100M $81,140	Less than $100M $79,447	Less than $100M $65,117	Less than $100M $40,396	Less than $100M $65,117	Less than $100M $60,242	Less than $100M $52,197	Less than $100M $65,295	Less than $100M $59,248
$100M to $999.9M $98,773	$100M to $999.9M $92,969	$100M to $999.9M $88,276	$100M to $999.9M $82,089	$100M to $999.9M $45,655	$100M to $999.9M $80,332	$100M to $999.9M $65,825	$100M to $999.9M $55,743	$100M to $999.9M $66,432	$100M to $999.9M $64,702
$1B to $10B $109,497	$1B to $10B $100,495	$1B to $10B $95,768	$1B to $10B $83,233	$1B to $10B $52,431	$1B to $10B $73,821	$1B to $10B $75,036	$1B to $10B $61,244	$1B to $10B $75,409	$1B to $10B $69,590
More than $10B $116,239	More than $10B $107,602	More than $10B $103,696	More than $10B $89,951	More than $10B $55,935	More than $10B $80,948	More than $10B $74,014	More than $10B $63,113	More than $10B $80,894	More than $10B $73,120

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CHARTS CONTINUE ON PAGE 44

A Sampling of Other Job Titles

Computer operator	Database analyst	Database architect	Database developer	E-commerce specialist	Messaging/e-mail/ groupware specialist	Network architect	Quality assurance specialist	Technical trainer	Webmaster
4%	2.3%	0.2%	1.9%	-1.1%	1.6%	1.7%	-5.5%	1.2%	0.2%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]	2002 Total [illegible]

Rational

STAFF AND ENTRY-LEVEL POSITIONS

Project leader	Software developer	Software engineer	System administrator	System architect	Systems programmer	Systems analyst	Senior systems analyst	Technician	Web developer
2.3%	1.3%	2.5%	2.3%	1.1%	1.9%	1.7%	1.1%	-2.8%	1.5%
Average salary **$72,479**	Average salary **$68,042**	Average salary **$75,413**	Average salary **$61,246**	Average salary **$89,609**	Average salary **$71,475**	Average salary **$59,433**	Average salary **$76,173**	Average salary **$40,763**	Average salary **$55,782**
Bonus **$4,372**	Bonus **$4,478**	Bonus **$4,357**	Bonus **$3,095**	Bonus **$9,163**	Bonus **$4,128**	Bonus **$3,907**	Bonus **$4,134**	Bonus **$2,233**	Bonus **$3,583**
Total **$76,851**	Total **$72,518**	Total **$79,770**	Total **$64,343**	Total **$98,772**	Total **$75,603**	Total **$63,340**	Total **$80,307**	Total **$42,996**	Total **$59,365**
2002 Total **$75,138**	2002 Total **$71,562**	2002 Total **$77,857**	2002 Total **$62,925**	2002 Total **$97,653**	2002 Total **$74,188**	2002 Total **$62,288**	2002 Total **$79,434**	2002 Total **$44,224**	2002 Total **$58,488**

A Sampling of Average Total Compensation by Industry

Banking	Banking	Business services/consulting	Computer services/consulting **$68,014**	Banking	Computer services/consulting **$73,563**	Banking	Banking	Computer services/consulting **$47,868**	Computer services/consulting **$64,622**
Computer services/consulting **$70,982**	Computer services/consulting **$70,642**	Computer services/consulting **$81,724**	Education **$52,073**	Computer services/consulting **$98,522**	Government	Computer services/consulting **$80,655**	Computer services/consulting **$82,576**	Education **$36,881**	Education
Government	Defense/aerospace	Defense/aerospace **$73,042**	Government **$62,162**	Defense/aerospace	Legal/insurance/ real estate	Energy/utilities	Education	Government	Government
Legal/insurance/ real estate	Finance/accounting	Finance/accounting	Legal/insurance/ real estate **$64,992**	Government		Government **$58,563**	Energy/utilities	Legal/insurance/ real estate	Legal/insurance/ real estate
Health care	Legal/insurance/ real estate	Health care	Health care **$62,880**	Finance/accounting		Finance/accounting	Government **$73,419**	Health care	Health care
Manufacturing (noncomputer) **$80,326**	Health care	Manufacturing (noncomputer)	Manufacturing (noncomputer) **$61,116**	Legal/insurance/ real estate		Legal/insurance/ real estate **$62,046**	Finance/accounting	Manufacturing (noncomputer)	Manufacturing (noncomputer)
	Manufacturing (noncomputer)	Manufacturing (computer) **$97,130**	Manufacturing (computer) **$71,643**	Manufacturing (computer) **$110,385**		Health care **$59,703**	Legal/insurance/ real estate **$77,259**	Telecommunications	
	Manufacturing (computer)	Telecommunications **$74,869**	Telecommunications **$73,649**	Telecommunications **$91,037**		Manufacturing (noncomputer) **$63,716**	Health care **$74,068**		
							Manufacturing (noncomputer) **$77,041**		

A Sampling of Average Total Compensation by Company Revenue

Less than $100M **$68,739**	Less than $100M **$66,426**	Less than $100M **$76,282**	Less than $100M **$56,458**	Less than $100M **$82,900**	Less than $100M **$65,306**	Less than $100M **$58,187**	Less than $100M **$76,408**	Less than $100M **$37,178**	Less than $100M **$54,031**
$100M to $999.9M **$73,583**	$100M to $999.9M **$74,812**	$100M to $999.9M **$82,121**	$100M to $999.9M **$66,875**	$100M to $999.9M **$95,553**	$100M to $999.9M **$74,151**	$100M to $999.9M **$63,715**	$100M to $999.9M **$79,105**	$100M to $999.9M **$45,385**	$100M to $999.9M **$59,896**
$1B to $10B **$85,162**	$1B to $10B **$78,575**	$1B to $10B **$79,486**	$1B to $10B **$72,453**	$1B to $10B **$103,351**	$1B to $10B **$77,372**	$1B to $10B **$67,730**	$1B to $10B **$79,840**	$1B to $10B **$50,322**	$1B to $10B **$65,315**
More than $10B **$81,630**	More than $10B **$80,061**	More than $10B **$84,291**	More than $10B **$74,374**	More than $10B **$107,070**	More than $10B **$91,457**	More than $10B **$68,838**	More than $10B **$87,679**	More than $10B **$56,353**	More than $10B

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↑ ↓ Indicates percentage change 2002-2003.

Methodology

Computerworld's 17th Annual Salary Survey was administered via the Internet. Both *Computerworld* print subscribers and visitors to *Computerworld.com* were included in the survey.

The collection of survey data began May 19 and was concluded July 18. A total of 16,519 people responded to the survey. Of these respondents, 14,984 were employed full or part time and were eligible to complete the entire survey. At the 95% confidence level, the margin of error for this sample size is plus/minus 0.80 percentage points.

Respondents were asked to report the percentage change in their compensation from 2002 to 2003. Compensation figures for 2002 were calculated based on the percentage change reported by the respondents.

For a detailed look at how we conducted this survey, visit our Web site: **www.computerworld.com**
QuickLink 41594

WHO THEY ARE:

Eighty-two percent of the respondents were men, 90% were employed full time, and 70% had a bachelor's degree or higher. The respondents had an average of 13 years in IT, and their average age was 39. Forty-four percent indicated that they have some level of certification.

Thirty-nine percent of our respondents indicated that they were in management, whereas 61% said they held staff or technical positions. Five percent said they were employed as contractors or consultants. The most well-represented industry was computer services/consulting, with 20% saying they worked in that field. Eighty-three percent have been in their current positions for an average of four years.

More than a quarter (26%) of the respondents said they hail from the North Central U.S., making it the most well-represented geographic region, followed by the South Atlantic (19%) and Pacific (15%) U.S.

STAFF AND ENTRY-LEVEL POSITIONS

23%	13%	25%	23%	11%	19%	17%	11%	28%	15%
Average salary **$72,479**	Average salary **$68,042**	Average salary **$75,413**	Average salary **$61,248**	Average salary **$89,609**	Average salary **$71,475**	Average salary **$59,433**	Average salary **$76,173**	Average salary **$40,763**	Average salary **$55,782**
Bonus **$4,372**	Bonus **$4,476**	Bonus **$4,357**	Bonus **$3,095**	Bonus **$9,163**	Bonus **$4,128**	Bonus **$3,907**	Bonus **$4,134**	Bonus **$2,233**	Bonus **$3,583**
Total **$76,851**	Total **$72,518**	Total **$79,770**	Total **$64,343**	Total **$98,772**	Total **$75,603**	Total **$63,340**	Total **$80,307**	Total **$42,996**	Total **$59,365**
2002 Total **$75,138**	2002 Total **$71,562**	2002 Total **$77,857**	2002 Total **$62,925**	2002 Total **$97,653**	2002 Total **$74,188**	2002 Total **$62,288**	2002 Total **$79,434**	2002 Total **$44,224**	2002 Total **$58,469**

A Sampling of Average Total Compensation by Industry

Banking **$83,906**	Banking **$64,927**	Business services/consulting **$79,480**	Computer services/consulting **$68,014**	Banking **$106,538**	Computer services/consulting **$73,563**	Banking **$66,576**	Banking **$82,664**	Computer services/consulting **$47,868**	Computer services/consulting **$64,622**
Computer services/consulting **$70,982**	Computer services/consulting **$70,642**	Computer services/consulting **$81,724**	Education **$52,073**	Computer services/consulting **$96,522**	Government **$72,776**	Computer services/consulting **$60,655**	Computer services/consulting **$82,576**	Education **$36,881**	Education **$40,511**
Government **$70,175**	Defense/aerospace **$68,716**	Defense/aerospace **$73,042**	Government **$62,162**	Defense/aerospace **$99,178**	Legal/insurance/ real estate **$79,425**	Energy/utilities **$74,280**	Education **$60,998**	Government **$40,668**	Government **$58,664**
Legal/insurance/ real estate **$75,366**	Finance/accounting **$89,418**	Finance/accounting **$88,590**	Legal/insurance/ real estate **$64,992**	Government **$79,072**		Government **$58,563**	Energy/utilities **$78,152**	Legal/insurance/ real estate **$44,474**	Legal/insurance/ real estate **$66,796**
Health care **$71,952**	Legal/insurance/ real estate **$74,164**	Health care **$77,345**	Health care **$62,880**	Finance/accounting **$112,615**		Finance/accounting **$72,618**	Government **$73,419**	Health care **$45,641**	Health care **$66,619**
Manufacturing (noncomputer) **$60,326**	Health care **$77,469**	Manufacturing (noncomputer) **$73,712**	Manufacturing (noncomputer) **$61,118**	Legal/insurance/ real estate **$87,239**		Legal/insurance/ real estate **$62,046**	Finance/accounting **$82,722**	Manufacturing (noncomputer) **$40,228**	Manufacturing (noncomputer) **$53,505**
	Manufacturing (noncomputer) **$74,366**	Manufacturing (computer) **$97,130**	Manufacturing (computer) **$71,643**	Manufacturing (computer) **$110,385**		Health care **$59,703**	Legal/insurance/ real estate **$77,259**	Telecommunications **$54,334**	
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$100M to $999.9M **$73,583**	$100M to $999.9M **$74,612**	$100M to $999.9M **$82,121**	$100M to $999.9M **$66,875**	$100M to $999.9M **$95,553**	$100M to $999.9M **$74,151**	$100M to $999.9M **$63,715**	$100M to $999.9M **$79,105**	$100M to $999.9M **$45,385**	$100M to $999.9M **$59,895**
$1B to $10B **$85,162**	$1B to $10B **$78,575**	$1B to $10B **$79,486**	$1B to $10B **$72,453**	$1B to $10B **$103,351**	$1B to $10B **$77,372**	$1B to $10B **$67,730**	$1B to $10B **$79,640**	$1B to $10B **$50,322**	$1B to $10B **$65,315**
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IT PROFESSIONALS

Senior Consultant
Responsible for integration testing for Enabler and Ensemble in the areas of Product Catalog/Price Plan, Rater/AGF/MPS, and Billing. Plan and implement the rollout of an order entry and provisioning system for the Indirect Sales Channel. Lead teams to ensure successful systems implementation utilizing ASP, HTML, JAVA Script, Visual Basic Script, and Oracle DB. Develop test plans and test scripts and lead teams for efficient testing and defect resolution. Responsible for gathering system requirements, applying business requirements to system requirements and identifying process gaps in the introduction support process. Identify key business processes to be impacted by the new system in the area of Billing, Customer Care, Sales, Price Plans, Collections and design post-launch Production Support processes. Produce quality deliverables to supplement the reporting needs of the project. Utilizing SQL queries and Excel Macros produce necessary reports in an effective process minimizing manual intervention. Provide required training for post implementation support. Manage defect tracking and reporting using Mercury Interactive Test Director tool. The wage offered is $63,390. The work schedule is Monday to Friday 9:00am to 5:00pm. The Minimum Requirements are as follows: Bachelor's degree or equivalent in Computer Science, Engineering (any type) Math, Information Systems, or Business Administration + 3 years exp. in the job offered or 3 years exp. as a Systems Analyst or Consultant. Employer will regard a foreign degree to be equivalent to a U.S. Bachelor's degree as determined by an accredited credential evaluation service. In addition, must have at least 6 months of experience utilizing ASP, SQL, HTML, Java Script, Visual Basic Script, Oracle DB, and Enabler and Mercury Interactive Test Director tool and at least 2 years of experience utilizing Ensemble.

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Senior Web Developer- Design and implement versions of medical management automation software. Develop desktop versions using VB and Access. Develop Web and PDA versions using J2EE (EJB/JSP). Requires B.S. in Electrical Engineering. Must have hands on knowledge of J2EE (EJB/JSP), MS SQL Server, Access and VB. 40hrs/wk (8:00 A.M. to 5:00 P.M.), $58,000.00/yr. Send two resumes/responses to: Case Number 200203053, Labor Exchange Office, 19 Stanford Street, 1st Floor, Boston, MA 02114

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The MathWorks leads the market in developing and delivering high performance interactive software products such as **MATLAB®** to the engineering and scientific communities. We're increasing our lead by hiring the best people for every job in the organization. We have the following positions available at our offices in Natick, MA.

Embedded Tools Developer
Develop the core of the company's automatic C code generation products for embedded real-time systems for the Real-Time Workshop software suite.

DSP Simulink Blockset Engineer
Engage in DSP algorithm development for audio and telephony application areas. Write floating point and fine-point algorithms in C++ and MATLAB to be implemented to support both simulation and embedded code generation for programmable and custom hardware targets.

GUI Component Engineer
Responsible for component architecture, user interface design, JAVA component construction, user visible API definition, and default properties definition of the Company's Graphical User Interface components.

DSP Software Engineer
Research, propose, plan, and implement graphical user interfaces (GUI) for spectral analysis, filter analysis and design, and other general digital signal processing (DSP) operations.

Product Developer
Responsible for the development of code generation products for automatic control systems. Will be primarily responsible for Data Management, Graphical User Interfaces (GUI) and new features.

The aforementioned positions are available at all levels and require a minimum of a B.S., M.S., or Ph.D. and 0-8 years' experience.

Additional Opportunities in the Following Areas:
- **Senior Installer Engineer**
- **Senior Manager, Comp, Benefits, & HRIS**
- **GUI Developer**
- **MATLAB- Senior Software Engineer**
- **Siebel Analyst**
- **Business Intelligence Analyst**

For fastest consideration interested candidates should reply via our website: http://www.mathworks.com/jobs

Attn: Human Resources - Job Code: CW1003, The MathWorks, Three Apple Hill Drive, Natick, MA 01760-2098.

We are an equal opportunity employer

www.mathworks.com

IT PROFESSIONALS

Network Product Engineer
eResponsible for assessing existing data networking and telecommunication infrastructure, utilizing extensive experience in Voice and Data Communication architectures utilizing Cisco and other networking equipment vendors. Responsible for defining a forward-looking data networking and telecommunication strategy to encompass voice and data communications, utilizing experience with WAN (Wide Area Network) strategy development. Apply CCNA (Cisco Certified Network Associate) certification to install, configure, develop and operate Voice and Data networking technologies such as LAN (Local Area Network) Switching, WAN Routing, Circuit Provisioning, QOS, IP SoftSwitches, Security, Wireless, ATM Frame Relay and MPLS (Multi Protocol Label Switching). Voice Over IP and IP-VPN (Virtual Private Network). Assist with procurement and sourcing of data networking and telecommunication services by interfacing with equipment vendors and carriers utilizing experience in network procurement and dealing with both equipment providers as well as network service providers from a sourcing perspective. Develop training materials and detailed documentation for knowledge transfer to appropriate operations personnel. The wage offered is $84,660/year. The work schedule is Monday-Friday, 9:00am-5:00pm. The minimum requirements are as follows: Bachelor's degree in Comp Science, Electrical Engineering, Telecommunications, Mathematics, Information Technology, Business Administration + 3 years experience in the job offered or 3 years experience as a Network Product Engineer. Related experience must also include Certification of CCNA (Cisco Certified Network Associate), Switching Fundamentals, TCP/IP, Routing Basics, WAN Technologies, Wireless Technology, Operating and Configuring Cisco IOS Devices.

Please send your resume, referencing Job Order Number WEB367014 to the Team PA Careerlink
B.E.C.S.
444 N.3rd St., 3rd Floor
Philadelphia, PA 19123

Exec Search, Inc. a technology-consulting firm in Wisconsin has multiple IT positions around the country w/ exp in one or more (depending on need) of the following skills: WebMethods Integration Server, WebMethods Trading Networks, WebMethods Enterprise Server, IBM MQSeries, IBM Assembler, IBM WebSphere Mainframes, CICS, DB2, COBOL, Unix, Sun Solaris, Windows, C/C++, Visual C++, VB, VB.NET, SAP, IIS, Visual Source Safe, Power Builder, Designer 2000, Developer 2000, Oracle, Oracle Application, SQL Server, MS Access, SQL, SQL Plus, PL/SQL, Data warehousing, Tools, HTML, DHTML, XML, TCP/IP, Perl, JSP, Weblogic, Java, Java Script, VB Script, ASP, ASP.NET, Clarify, Documentum, CoreDossierX, Rational Rose, Testing tools and QA methodologies. Some positions req. Bachelor's degree others Master's in Computer Science or in a related field, or its equivalent as well as relevant IT exp. Relocation may be necessary for most jobs. Send resume to Exec Search, Inc. C/O ISS, 1300 Bent Creek Blvd Ste 200, Mechanicsburg, PA 17050

Chief Operating Officer
U.S subsidiary of Israeli desktop marketing and technology solutions company seeks COO to direct multinational software development operations in Israel and the United States. Responsibilities include: direct strategic planning and the development and implementation of marketing strategies, including the development and launch of new products and services; direct quality assurance management, R&D, inventory control, human resources and customer distribution operations. Direct operational managers in Israel and the U.S. report directly to Israeli Board. Must have a Bachelor's degree or foreign equiv. and at least 2.5 years of experience as an Account Manager in the desktop marketing industry. Frequent travel to Israel required. Email application to: Fiona Walsh, HR Manager, Fiona@cydoor.com. Specify 'Application' in subject line of email. Cydoor Technologies Inc., 135 West 29th St., Suite 302, NYC, NY10001

COMPUTER PROFESSIONALS

Opportunities for:
- PROCESS CAPABILITY ANALYST
- QC ANALYST
- WEB ARCHITECTS/ DEVELOPERS
- SYSTEMS ANALYSTS
- WEB GRAPHIC DESIGNERS
- NETWORK ENGINEERS
- PROGRAMMER/ANALYSTS
- SOFTWARE ENGINEERS

SKILLS:
- COLD FUSION · SPECTRA
- ORACLE · VISUAL BASIC
- VISUAL C++ · SIEBEL · ASP
- COM, DCOM · JSP · HTML
- JAVA, JAVA BEAN · EJB JAVA SERVLETS · WEBSPHERE
- IBM MQ SERIES · XML UML
- MTS · CLARIFY · PERL
- OBJECTPERL · SPYPERL
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Programmer Analyst. Sought by Englewood Colorado consulting company to work in various unanticipated locations throughout the U.S. Under direct supervision, analyze, plan, develop, test and document computer programs including network communication programs. Evaluate user requests and software program requirements for new and modified programs. Write specifications, code, test and debug computer programs. Use of C, C++, Java, SQL, DB2, Oracle, JSP, HTML, HTTP, COM, SQL, XML and Windows NT. Reqs: Bachelor or equivalent in Computer Science, Computer Engineering, Physics, Mathematics or related degree. Plus 1 year in the job offered or 1 year in a related occupation including Software Technical Consultant or Systems Analyst. Will accept 3 years of college education and 3 years of experience in lieu of required education and experience. $60,000/year. 40/hrs/wk, 8AM-5PM. Respond by resume to WORKFORCE DEVELOPMENT PROGRAMS, PO Box 46547, Denver, CO 80202, and refer to Job Order No. CO6058861

Senior Software Engineer. Work in the company's mixed signal test language integrated development environment test systems software department. Design and build production software infrastructure for mixed signal test systems. Analyze customer requirements and devise solutions to increase system productivity and units per hour tested. Extend language processor for the system. Enhance existing system and create new debugging tools and display software for mixed signal test language development environment. Work extensively with C/C++, LEX and YACC on Unix. Will use experience in system software development dealing with system hardware. Requirements include a Bachelor's degree or equivalent in Computer Science, an Engineering discipline or closely related field and five years of work experience to the job offered or related field of software development using C/C++ on UNIX platform. Applicants must have unrestricted authorization to work in the United States. Salary $87,991/year 40 hours/wk. Respond with two copies of resume to Case #2002202202, Labor Exchange Office, 19 Stanford St., 1st Fl., Boston, MA 02114

Sr SAP Basis Consultant (Project Manager)/Cs headquartered in Philadelphia/WB work at client sites in PA and throughout the US. Works w/DBA & Basis teams on installing and supporting activities of SAP on OS/390 DB2 platform. Responsible for BASIS Administration of SAP R/3 implementation, SAP Security, performance monitoring & tuning, SAP Database administration programming in ABAP/4, applying OSS notes, profile generators, etc. Supports & trouble shoots w/SAP on OS/390 DB2 platform. Travels to client sites throughout US on long & short term basis. Works nights, weekends & holidays as required, especially for on call support. Supervises & manages SAP projects & teams of SAP consultants. Trains other SAP consultants to perform above duties. 40+hrs per wk; c. 10hrs OT, varies, 9am-5pm, sometimes until 7pm/also weekends for on call support. $88/hr. Masters or equivalent education or experience and 2 yrs exp as Sr SAP Basis Consultant (Project Mgr) or 2 yrs as Software Engineer/SAP Basis Administrator. Submit resume to Career Link, Philadelphia Downtown Job Center, 930 Washington Ave, Phila, PA 19147-3698. Refer to Job Order # WEB361679

Infobahn Technologies has immediate full time openings (2 positions) for Programmer/Analyst to design, develop & implement Oracle Technical Applications using Oracle Apps (11i, 11.0.2,10.7, 11.0.3, 5.0.5) & Modules (AP, AR, GL, OM, OE, INV, iProcurement, Workflow Builder, Purchasing, Contracts & Services, AOL) & exp with tools such as Discoverer 3.1, iStore, Forms 4,5,6i, Reports 2.5, 6i, PL/SQL & Datamodeling exp. Req. BS in Comp. Sci. Engg/Rel field with 2 yrs exp. Send resumes to: Infobahn Technologies, (HR) 288 Walnut St. #410, Newton, MA 02460

PROGRAMMER ANALYSTS for Lincoln, NE office. Develop software applications using VB, Oracle, XML, UML, Interwoven, Coolgen, MQ-series, MTS, SQL server. Bachelors Degree or equivalent reqrd to Computers, Engineering or related field + 2yrs of related exp. 40 hrs/wk; Must have legal authority to work permanently in the U.S. Send resume to HR Manager, Infocrees, Inc. 1823 Hartley St, Lincoln, NE 68521

Computers-Software Engineers wanted. Candidates must possess BS or equiv. and/or rel. work exp. Duties include: Extract data from disparate POS systems; Design database & upload components to analyze the extracted data; Work with Visual Basic, ASP, Javascript & Transact SQL. Knowledge of hospitality industries & ability to work with multiple databases preferred. Fwd. resume & ref. to Managed Data Group, LLC, Attn: HR, 1843 Spring Garden St., Greensboro, NC 27403.

Kamo Consulting Inc.
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We are a fast growing Consulting company based in North Carolina. Excellent opportunities for Programmers, Systems Analysts, DBAs.

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Send your resume to Rod McFadden
Kamo Consulting
Fax: 704-896-9580
Email: rod@kamco.com

Software Developer
Siemens ITS Atlanta office seeks a Software Developer to design and develop distributed real-time system software for the transportation engineering industry to support dynamic real-time traffic data for advanced traffic management systems. Req: a Bachelor's degree in computer science or closely related field and proficiency in using C++, Java, SQL and distributed systems architectures, and basic knowledge of SNMP, and NTCIP. Fax resume to Walter Townsend at 770-814-5180. For more information, visit www.itseemens.com. Job Code: TN-001

Sr. Programmer/Analyst, Washington, DC. To design, develop, enhance, implement, debug and maintain IVR/AVR applications in voice/data integration and network infrastructure based on VoiceXML including Nuance/Speechworks and TTS, Java applications server; MySQL, Oracle, Dell PowerVault Series, Linux and Windows, Dialogic, NMS and E1/ISDN and Gateways-H323 and SIP. Reqd: M.S. in Computer Networks & Communications & 2 yrs exp. M-F, 40hrs/wk. Send resume to: S. Arsenyev, EastBanc Technologies, LLC, Ref. #99V,3307 M Street, N.W., Suite 200, Washington, DC 20007.

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Programmer Analyst
Responsible for developing, applying and maintaining quality standards for software applications. Develop and execute Automated Software test plans extensively utilizing Mercury Interactive WinRunner, LoadRunner, TestDirector, Analyze and write test standards and procedures. Maintain documentation of test results. Bachelors Degree in Computer Science or relevant field with 4 Years of work experience in related occupation. 40 Hrs./Week. $70,000/ annum. Must be willing to relocate to various unanticipated work locations throughout the USA every 4 to 10 months, employer paid. Must have proof of legal authority to work in the United States. Send your resumes to the Iowa Workforce Center, 215 Watson Powell Jr. Way #100, Des Moines, Iowa 50309-1727. Please refer to Job Order IA1101805. Employer paid advertisement.

Database Programmer/Design
develop and maintain a proprietary client-server database application that provides centralized control of bug, knowledge, customer support, and sales databases using Visual Basic, MTS and SQL Server. Design, develop, and maintain e-commerce site for U.S., European, and Japanese market using Visual Basic, SQL stored procedures, HTML, and JavaScript. Design, setup, and administer SQL Server database and Internet Information Server 4.0. HPW, M-F. Requires bachelors in computer science or engineering plus 1 yr exp. as database programmer or application developer/related position. $51,563/yr. Resume to Jorge Miranda, VP Product Support & Maintenance, ACD Systems of America, Inc., 1150 NW 72 Ave., Miami, FL 33126. (305) 596-5644.

COMPUTER
Technosoft Corporation has multiple openings for Programmer/Analysts, Software Engineers, Project Leads/Managers with skills in Java, Per, Siebel, Oracle/Informix DBA, GUI, Java C++, CRM Applications, ERP & Datawere-housing. Send resume to: 1250 Oakmead Parkway, Suite 210, Sunnyvale, CA 94085 or email to jobs@technosoft-corp.com

Information Technology Support
Specialist sought by real estate investment trust company in Englewood, CO to work in Englewood and other unanticipated job sites in the U.S. to resolve problems with proprietary software applications, LAN, WAN and hardware. Contact appropriate outside vendor to resolve problems as needed. Consult with network infrastructure team and local phone carriers to troubleshoot line and network problems. Design LAN, configure LAN and oversee installation at remote sites. Expand network including laying cable, redesigning network and implementing connectivity. Complete reconfiguration and system updates of hardware and software. Build and configure servers. Utilize Citrix network system and Telnet in resolving computer problems. Setup and maintain telecommunications system. Provide desktop support for computer users utilizing remote assistance program as needed. Requires bachelor's in Information Systems Management; working knowledge of remote assistance programs, Telnet, WAN and LAN protocols, network design and server configuration. (Working knowledge may be gained in an academic or work setting.) M-F, 8am-5pm; $41,850/yr. Respond by resume to Employment Programs, PO Box 48647, Denver, CO 80202 and respond to JON C05059647.

Software Engineer
Responsible for Unix System Administration, Planning, Installation Configuration, and Integration of Various UNIX platforms. Conceptualize Design, Construct, Test, Implement and Optimize infrastructure Systems. Develop Architects Client/Server solutions and environments. Create application program interfaces and network designs. Establish and Maintain Security, Integrity and Business continuity controls and documents, provide 24x7 on-call support. Bachelors Degree in Computer Science or relevant field with 5 Years of work experience in related occupation. 40 Hrs./Week. $75,000/ annum. Must be willing to relocate to various unanticipated work locations throughout the USA every 4 to 10 months employer paid. Must have proof of legal authority to work in the United States. Send your resumes to the Iowa Workforce Center, 215 Watson Powell Jr. Way #100, Des Moines, Iowa 50309-1727. Please refer to Job Order IA1101787. Employer paid advertisement.

NetSoft has openings for IT professionals. Skills in COBOL II, CICS, MVS, JCL, VSAM & DB2, HTML, Java, PWB, IIS, JDBC, ASP, JavaScript, XML, C/C++, Oracle preferred. Applicants must have BS/MS or equivalent. Travel maybe required. Apply at jobs@nstc.net. EOE.

Pitcairn Inc. (Ahlstrom America) is looking for System/Programmer Analyst or design animation using XP, ME, 95, UNIX, Novell Network. Applicant must have Bachelor with exp in Oracle, Novell. We offer competitive wage, standard benefits. Please contact: joanne@sunwoo.com

Software Engineer
Provide technical support to existing systems. In addition, design, develop, code, unit test and debug Annuities/Insurance based financial systems and applications utilizing Progress 4GL (GUI and CHUI) ADM and appserver technology. Must have Bachelors Degree or foreign equiv. in CS or related field & 2 yrs. exp. or 2 yrs exp in a related position w/ability to use VPAS and Progress. 40.0 hrs./wk. 9:00 AM - 5:00 PM. Send cover letter and resume to: McCamish Systems, LLC, 5425 Powers Ferry Road, 3rd Floor, Atlanta, GA 30339, Attn: HR Manager.

IT PROFESSIONALS

Senior Consultant
Evaluate & analyze business process requirements, define systems strategy, develop systems requirements design, prototype & implement business solutions & define support procedures. Perform detailed analysis & effective diagnose, and propose solutions to client business process & technology issues with Cross Application Time Sheet (CA-TS) configuration (with integration to PS, PM and FI/CO) & implementing Time Evaluation including the development of user enhancements for Quota generation. Configure & implement Work Schedules, Absences & Attendances and automatic Quota Accruals utilizing SAP HR. Configure schema and personnel calculation rules for Time Evaluation for Union and Non-Union employees to calculate work and non-work time, overtime, holiday and convert the hours in time type and time wage types.

WAGE: $98,850/year
Hours worked: Monday-Friday 9:00am-5:00pm

MINIMUM REQUIREMENTS:
Bachelor's degree in Computer Science, Engineering (any type), Math, Business Administration or Information Systems + 5 years exp. in the job offered or 5 years exp. as a Senior Consultant, SAP HR Consultant, Consultant, System Analyst, Database Analyst. Related experience must include SAP HR and at least 6 months in Cross Application Time Sheet (CA-TS) configuration (with integration to PS, PM and FI/CO).

Please send your resume referencing Job Order Number WEB366876 to the Team PA Careerlink @ E.C.S. 444 N.3rd St., 3rd Floor, Philadelphia, PA 19123.

Programmer/Analyst. Delphi to program, analyze, test, troubleshoot, and develop Delphi software as a front end for use in multiple RDBM (such as Foxpro, Oracle, Interbase, and Sybase) legacy informational systems installed in a distributed client server environment including implementation in an intra/internet environment. May use tools such as MIDAS, SOAP, COM/DCOM, Object Pascal, ASP, ADO, XML, Web Logic Server or Web Services, T-SQL, DLL, TOAD, Quick Reports, IIS, Swing or JSP as required in performance of duties. Requires Bachelor's Degree in Computer Science, Mathematics, or any Engineering or Physical Science field and one year direct experience. Work location: Various unanticipated client sites. Send resumes only, no calls, to: Perry Sensepathy, Genome International Corp., 583 D'Onofrio Dr., Madison, WI 53719.

Systems Analysts to work as consultants at client sites in the U.S. and abroad. Implmt customize & upgrade Oracle ERP s/ware pkgs. Reqs BA/BS in Comp Sci, Eng'g, Bus, Logistics, HR, or related field + 2 yrs exp w/Oracle Apps or DB's. Send resumes, refs, and salary req's to Attn: HR, IT Convergence, 150 E. Gilman St., Suite B2200, Madison, WI 53703 or resume@itconvergence.com

INFORMATION TECHNOLOGY

Director, Financial Management System
Responsible for planning for and leading the implementation of a new University Financial system, including components related to research administration and compliance. Past experience in a university or similar highly decentralized environment is desirable, with career emphasis on planning, design and implementation of large, complex enterprise systems. Excellent written and oral communications skills required. Bachelors degree in computer science, business, accounting or related field required, MBA preferred. Minimum 10 years of experience in a professional information technology and financial system environment required. For a complete description, go to www.it.northwestern.edu

Director, Technology Support Services
Responsible for recruiting, enlisting, training, evaluating and managing the professional staff. Defines project scopes. Develops and maintains unit budget. Measures satisfaction with the services offered. Consults with University divisions on appropriate new services. Bachelors degree required. Minimum 10 years of experience both as an end-user and administrator in two or more areas of computing and networking support. Excellent oral and written communication skills.

Project Manager, Financial Management System
Assist in managing university wide financial management system replacement. Requires experience managing projects and staff with technical hands on involvement. Background in financial systems, enterprise systems, relational database, and web-based self-service preferred. Excellent written and oral communications skills required. BS in Computer science or related field required. Minimum 5 years of experience in a professional information technology and financial system environment.

Web Developer
Experienced web developer with strong analytical and communications skills. PeoplaTools, HTML, JAVA/CGI Scripting, with web to database connectivity required(Oracle preferred). Familiarity with Dreamweaver, Photoshop, and IIS desired. Bachelor's degree in computer science or related field required. Minimum 3 years in a professional information technology environment.

Service Analyst
Customer service rep for voice/data plus products. Consult w/customers, coordinate work orders with field ops. Basic programming knowledge of Nortel SL-100 switch and Octel voice mail system preferred. Microsoft Windows and Microsoft Office experience. Excellent oral and written communication skills. Excellent customer service skills. Degree preferred, telecom experience preferred.

We offer a competitive salary and excellent benefits. Send Resumes to

NUIT JOBS
Northwestern University, 1603 Orrington, Suite 900, Evanston, IL 60201.
Email: nuit-jobs@northwestern.edu Fax: (847) 467-6500
Visit our Web site at: **www.northwestern.edu**

Software Engineers reqd by S/ware Dev & Consit Co. Duties incl S/ware Systms dsgn, Object Oriented Analysis & Dsgn using skill sets incl Java 2 Enterprise Edition Technologies (EJB, XML/XSLT/STD/JAXB/JDOM APIs, Web applic dvlpmt using Java, Weblogic or iPlanet, Rational Rose, Application Server Oracle, Http, Http Unit, Unix, Ant, JUnit, OCAJ, or SQL d/base server data prgmg using SQL, Store Procedures & functions Data modeling using MS VISIO or Erwin, IIS Apache Webserver admin & maintenance. Application load balancing & configuration. Job loc: Chicago, IL & various unanticipated client sites in US as assigned. Req: Masters in either Math or Sci. or Comp. Sci. or Engg. (any discpl). (Will accept an equivalency based on 4 yr undergraduate dgr followed by 5 yrs of progressive exp in relevant field). 40 hrs/wk, 9a-5p, M-F. Apply to: CEO, Engeaya, Inc., 555 West Madison St., Ste. 1-2311, Chicago, IL 60661.

Sr. SW Engr. - Develop, integrate, maintain & test complex features & services over communications protocols including, but not limited to: Sigtran, SS7/ICCS7 & ISDN. Participate in design & code reviews of new software & modifications to existing software. Analyze & document computerized telecommunication system software requirements, functional specifications, architectural specifications & design specifications. Must have M.S. in Comp. Sci., Comp. Eng'g, Electrical Eng'g, Electronics Eng'g or equiv. + 2 yrs. exp. in job offered or 2 yrs. exp. w/telecom SW development, must have proficiency in C programming as well as knowledge of telecommunications protocols. Exp. may be gained before or after M.S. In the alternative, employer will accept Bachelor's degree & exp. equiv. to a Master's degree. 40 hrs/wk., Sal. $82,833/yr. Send 2 copies of resume to: Case #CO02002760, Labor Exchange Office, 19 Staniford St., 1st Fl., Boston, MA 02114.

Boehringer Ingelheim Pharmaceuticals Inc. has immediate openings in its Ridgefield, Connecticut facility for the position of Senior Software Engineer.

Develops and implements systems using a variety of technical tools, identifies problems or opportunities to increase effectiveness and productivity and reduces operational costs through optimal use of information systems.

Must possess a Master's degree or equivalent in Business Administration or a related field and three years of work experience in an IT field. In the alternative, a Bachelor's degree in Computer Science, Electrical Engineering or a related technical field and at least five years of relevant business experience in marketing and operations would also be acceptable. Experience to include college coursework/project or work experience with: Documentum WDK, DFC, Web Publisher/Desktop, Java, EJB, Servelets, JSP, Web Logic, Oracle, VB, COM/DCOM, IIS, XML, HTML/DHTML and JavaScript, and developing client/server and web applications.

Resume and/or cover letter must reflect each requirement above and specify reference code AD-GCD/GC0503 or it will be rejected.

Forward resume to: BI Staffing Center, PO Box 534, Waltham, MA 02454. EOE.

SOFTWARE ENGINEER
APPLICATIONS wanted by wireless equipment sales & services co. in Houston, TX. Must have Master's in Computer Science or MIS, plus exp. Respond by resume only to: Mr. N. Maaz, A/K - #10, CellMart Wirsless, Inc., 7447 Harwin, Ste. 107, Houston, TX 77036.

TransZap, Inc. seeks applicants for the position of Java Developer in Denver, CO to engage in full life-cycle software development of web-based, multi-tier software applications for the oil and gas industry. Requirements include bachelor's in computer science or related field experience designing and developing software applications using Oracle, RDBMS, Unix, Linux, Sun Solaris, J2EE, UML, EDI and OOT. Respond by resume to: TransZap, 1580 Lincoln St., Suite 930, Denver, CO 80203.

Information Analyst. Responsible for the day to day support and maintenance of customer's proprietary product. Develop enhance and maintain the related systems including software development kits runtime engines, compilers debuggers handle license mechanism. Port middleware systems tools, transaction processing server (TPS) operating system utilities from Compaq/HP Alpha architecture to the latest Intel Itanium architecture. Test, debug and certify on new releases. Answer user questions and respond and resolve user problems. Investigate problems fix the code and issue new product releases as appropriate. Ensure new hardware and operating systems updates continue to work on the new platforms through conformance and regression testing making product updates when needed. Utilities and tools environments include VMS debugger, dbx Microsoft Visual Studio and Visual Studio Net, Oracle 7.3.2 8.x, RDB, OpenVMS Journaling, IIS, Apache Web servers in VMS, UNIX and Windows. Requires Bachelor's degree in Computer Science and 2 years experience in the job offered or 2 years in software development, enhancement and certification using multi-threaded programming and client/server technology in a cross platform environment including VMS, Windows and UNIX, and ISO 9001 standards. 40 hours per week, 8AM to 5PM Monday to Friday. Salary $75,000 per year. To apply send two (2) copies of resume/letter of application to Job Order #2003-453, P.O. Box 989, Concord, NH 03302-0989.

Database Administrator to do logical and physical design of Oracle database; Code test and implement Oracle scripts applying knowledge of Database Management Systems. Calculate optimum values for Oracle database parameters, performance tune Oracle databases. Model Oracle database security, manage backup and recovery of Oracle databases, make changes to Oracle database applications using knowledge of Oracle 8i, C, Access, Clarify and PowerBuilder. Requirements: Bachelor's Degree educational or functional equivalent, in Computer Science or related field and two years experience as a DBA, expertise in Oracle database administration which includes logical design, physical design, performance tuning, backup and recovery, coding of scripts, knowledge of Oracle 8i, C, Access, Clarify and PowerBuilder. Salary: $66,000/ year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and relocation. Apply: Fayette County CareerLink, Attn: CareerLink Program Supervisor, 135 Waylan Smith Drive, Uniontown, PA 15401. Job No. WEB367223.

Computer Prog'r/Analyst: design & dev cl. server/web apps, using Java, C++, VB, JSP, XML & Weblogic app svr. Study exist db systems, using Oracle, PL/SQL in UNIX. Analyze problems, troubleshoot. BS in CS, MIS or any eng'g rel + 2 yrs. exp or 2 yrs. sys analyst/prog rel. Must have exp. using the above techs. Multiple jobsites, may change to other sites throughout US as req. Send res. showing Job# PA01 to Advansoft, 1807 Carriage Ct, Addison, IL 60101. Legal rt to work must be stated.

Intellisys Technology is a fast growing Chicago based IT consulting group with clients all over the USA in leading edge areas such as eCommerce, ERP, Automated Testing and Client Server. MultiTier Systems. Intellisys is looking for Programmer Analysts, System Analyst, Computer Programmers, Software Developers and Project Managers with experience in one or more of the following skills.

C++, C, VC++,
Java/Java Web Server, Java Script
VB, VB Script, ASP, ActiveX
COM, DCOM
CGI, Servlets, CORBA, Perl
VJ++
HTML, DHTML, XML
JAVA APPLETS
COLD FUSION, HTTP
SEGUE/RADVIEW TOOLS
Large Scale System
Design/Architecture Testing
Experience

All jobs require a minimum of a Bachelors Degree or equivalent in Computer Science or related fields + 1yr exp reqd depending on position.

Project Managers require a Masters in Business Administration or its equivalent. Frequent travel and/or relocation. If you are interested in our company, please mail, fax or e-mail your resume including reference number CW1003 to: INTELLISYS TECHNOLOGY LLC, 600 Enterprise Dr, Ste 208, Oak Brook, IL 60523, fax (630) 455-1333, e-mail recruit@7hillsys.com

Web Developer

Senior Web Developer designs, develop, maintain proprietary web applications implementing HTML, Visual Basic, XML/XSL, ASP, JavaScript and ADO. Developer provides web based product support to clients, coordinates with Weather Research Team to deliver real time, reconstructed worldwide weather data products. Developer also aids in delivery of loss estimates in real time during catastrophes. Participates in architectural design of new web products. Reqs: Bachelor degree in computer design related field incl industrial or comp engineering + 2 years exp in web related work. $60,900 year. FT.

Applicants respond to Case #200202925, Labor Exchange Office, 19 Stamford Street, 1st Fl, Boston MA 02114.

PROGRAMMER/ANALYST to analyze, design, develop and implement IVR applications on Nortel IVR-VPS/MPS platform using Periphro, Periphro Studio, Periphro Periproducer, Java, C, C++, JavaScript, MS SQL Server Access, VB, Oracle and Shell Scripts. Require Bachelor's degree (or equivalent) in Computer Science/ Information Systems, or a closely related field with 2 yrs of exp in the job offered or as an IVR Developer. Each 3 yrs of progressively responsible work exp in the field will be considered equivalent to 1 yr of college education. Extensive travel on assignment to various client sites within the U.S. is required. Competitive salary offered. Send resume to Nagesh Ganta, Management Decisions Inc, 4940 Peachtree Industrial Blvd, Ste 310, Norcross, GA 30071. Attn: Job PP.

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Conway rebuts Ellison, promising to support PeopleSoft 7 software 'forever'

BY MARC L. SONGINI

PeopleSoft Inc. last week reported a smaller-than-expected loss of $7.3 million for the third quarter on revenue of $624 million. The Pleasanton, Calif.-based company said it would have been profitable if not for costs related to its August acquisition of J.D. Edwards & Co. **Craig Conway,** *PeopleSoft's president and CEO, spoke with* Computerworld *about the results, PeopleSoft's effort to fend off a hostile takeover bid by Oracle Corp. and other topics. Excerpts follow.*

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Did Oracle's offer to support PeopleSoft 7 for at least 10 years lead to the changes in technical support that you announced last month [QuickLink 41524]? We will support Version 7 forever. We're still offering technical support and bug fixes for PeopleSoft 2. That was a great, classic play on words by Larry, implying we didn't support PeopleSoft 7. What we did recently was expand the amount of time you get upgrades and scripts and tax tables to make customer support even sweeter. The core technical support has been indefinite since the beginning of time.

Do you have any comment about your third-quarter financial results? We beat guidance by 7 cents [per share] in earnings, and license revenue was way above the [predicted] range. The data speaks for itself. We had 175 brand-new, never-been-sold-to customers in the third quarter. We had the average transaction size sales price increase, not decrease. Eleven customers were cross-sell customers [with J.D. Edwards], and we haven't trained the sales force in cross-selling yet.

SAP CEO Henning Kagermann said that because of the fallout from the Oracle/PeopleSoft fight, SAP was losing more deals than before on the basis of cost. Are you discounting prices? There was no more discounting than in any other quarter, and it's been a buyer's market, not a seller's. I saw the remarks by Henning, and either they stand up to the math or don't. We didn't do any higher discounting.

Do you now see SAP as your top competitor? SAP is the only company ahead of us. That's unlike even two years ago where, when you looked at the two companies, in some areas one would have what the other doesn't.

Some users are questioning PeopleSoft's commitment to J.D. Edwards' green-screen World products and want to see that software maintained as a third line of business. It is a third line of business. And I think there's an absolute desire for our AS/400 customers to have enhancements and developments and innovations. The AS/400 product is supported both in World and EnterpriseOne. [But] most innovations are on the modern architecture, EnterpriseOne. **42351**

Continued from page 1

PeopleSoft

PeopleSoft offers its flagship PeopleSoft Enterprise suite.

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The IBM 5250 terminal user interface that World supports can process financial data more rapidly than the Web-based screens included in the EnterpriseOne software, said Julie Mauser, IT manager at the Cargill unit. "Green-screen works very nice in certain types of data entry," she noted.

Cargill isn't alone. At this point, about 10 of the 20 companies that belong to the World Advisory Council have expressed interest in trying to create a groundswell of support for more spending on World, said Bill Tritch, a Cargill product manager who is the council's president.

By year's end, the advisory council plans to launch a survey of companies running World to gather input that will be presented to PeopleSoft, said Dave Hyzy, director of IT at Benderson Development Co., a Buffalo, N.Y.-based real estate developer that uses World's financial modules.

Hyzy acknowledged that some companies "have grown fat and lazy with the idea of not having to migrate anything over and just want to keep going on indefinitely" with technology they already have in place. But, he added, "I don't think that's representative of World customers. Most of us realize over time the product has to grow or we're going to have to do something else."

In particular, Hyzy said he would like to see PeopleSoft add an HTML interface and integrate World with IBM's WebSphere middleware so developers could craft Java applications that would help streamline data workflows and electronic data interchange transactions.

PeopleSoft acquired Denver-based J.D. Edwards in August and last month announced an EnterpriseOne upgrade that finally gives the 6-year-old multiplatform software a functionality edge over World [QuickLink 41542].

Craig Conway, PeopleSoft's president and CEO, said in an interview that World will remain "a third line of business" for the Pleasanton, Calif.-based company (see Q&A above). Conway agreed that PeopleSoft has an "absolute desire" to see continued enhancements to World as well as EnterpriseOne. But most development will be targeted at the Web-based EnterpriseOne line, he said, adding that World users can migrate without paying new software license fees.

World has been updated with about 200 enhancements annually over the past three years, said John Schiff, director of product strategy for the green-screen line. PeopleSoft plans to maintain a "very active engagement" with users of the software, he added. Asked about the survey that's planned by the user advisory council, Schiff said, "We are absolutely open to feedback and would look at the results and see what priorities the customers have." **42316**

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PeopleSoft's CEO Says Oracle Offer No Longer Seen as Threat

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Installed Base

Total number of J.D. Edwards users: **6,700**

Number that still run World

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.Com Rules

STRATTON SCLAVOS, CEO of VeriSign, says his company didn't intend to break anything on the Internet when it launched its Site Finder wild-card service [QuickLink 41642]. In fact, Sclavos told me a few days ago, VeriSign spent months testing Site Finder. And it *did* conform to existing standards. And when Site Finder went live and some things broke, VeriSign went to work fixing them as quickly as possible.

Do I believe him? Sure. But what matters more is that on Oct. 3, when the Internet Corporation for Assigned Names and Numbers unambiguously told VeriSign to pull the plug on Site Finder, the company complied.

That was the right thing to do. Yes, it came after weeks of brinkmanship, with ICANN issuing advisories and responses and recommendations about Site Finder, and VeriSign declining to reverse its changes to the way the Domain Name System worked, with the level of sound and fury rising daily. But wheo ICANN finally made a formal demand under its contract with VeriSign, VeriSign did the right thing.

Now the questioo is whether ICANN and VeriSign will keep doing the right things.

VeriSign needs to rebuild the trust that we all want to have in the company that controls a critical part of the Internet's infrastructure — the .com root DNS servers.

ICANN needs to successfully resolve the Site Finder dispute — and then set up rules and processes that will make this kind of dispute less likely to happen again.

Sclavos says that's what he wants. His company has invested a bundle in upgrading the system for delivering all those .com domain names. Now VeriSign needs to make money leveraging that investment. But to do that, Sclavos says he needs to know what the rules are.

Even if those rules put the keeper of .com names on a shorter leash than, say, the people running minor-league top-level domains like .info or .biz?

"I fully understand the argument that .com is different," Sclavos told me. "If they want to be discriminatory toward .com and VeriSign, that's fine — just give us the rule book by which we get to play in the market. But to have oo rules, or to have those rules change oo you as you're trying to make investment and research-and-development decisions, is not commercially reasonable."

If that's really the case, theo there's an opportunity here for both ICANN and VeriSign.

Make those rules, guys. Hammer them out informally. Keep the legalisms and fear of loopholes out of them. Be practical. Be brutally pragmatic about what will fly. But draft those rules.

Sure, they'll he tentative. Yes, they'll he off the official books. And before they become formal policy, they'll have to go through ICANN's full deliberative process.

But they'll create a clear working understanding between ICANN and VeriSign, That means VeriSign gets the clarity it's looking for, and ICANN gets the cooperatioo it needs.

More than that, those rules will represent the model for a fast-track process at ICANN. That may not sit well with all ICANN constituencies — especially the people still smarting from VeriSign's reluctance to ax Site Finder.

Dealing with those coocerns will require real leadership from ICANN — and maybe a few sacrifices from VeriSign, to show that it's acting in good faith. But if it works, we'll have a oew process for domain-name innovation — one that's faster than ICANN's full deliberative process and a lot more orderly than today's try-it-and-see-if-anyooe-objects approach. That will go a long way toward restoring credibility for both ICANN and VeriSign.

Especially since the alternative may he watching the Internet get broken again — and again, and again. **42309**

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